ARCHIVES OF

Physical Medicine and Rehabilitation

APRIL 1960
Volume 41, No. 4

3rd International Congress of Physical Medicine

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3° Congreso internacional de Medicina Fisica

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AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION
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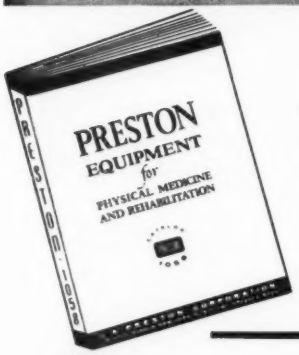

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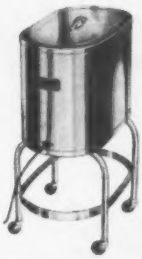

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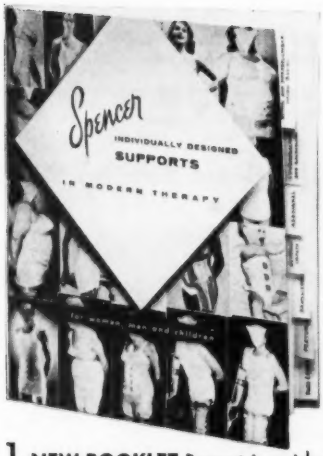

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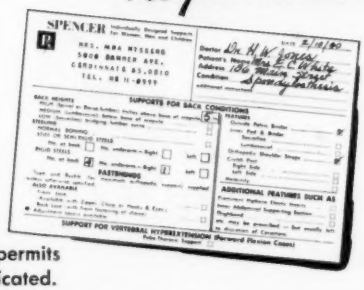
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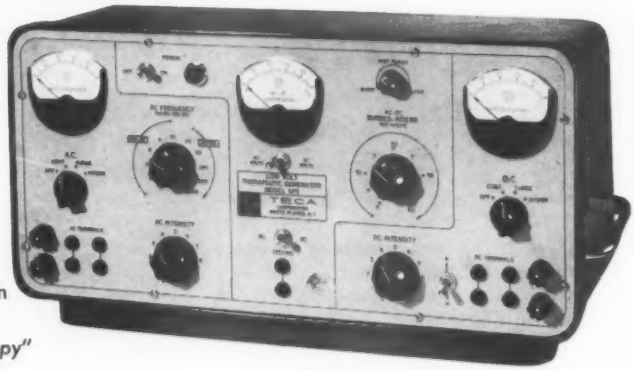

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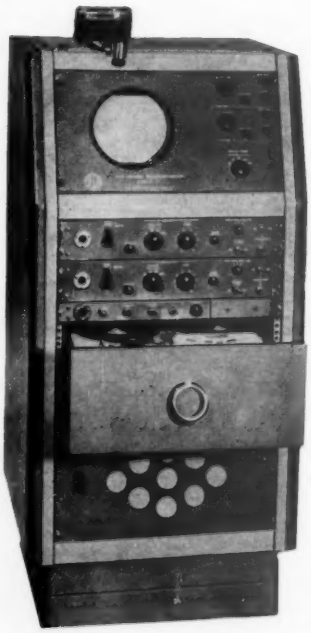

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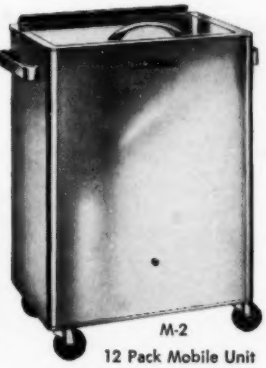

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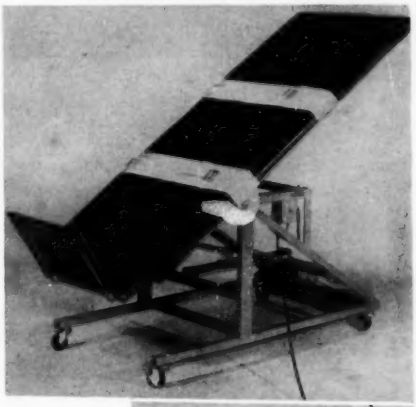

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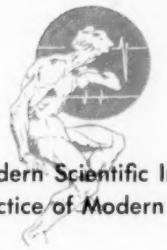

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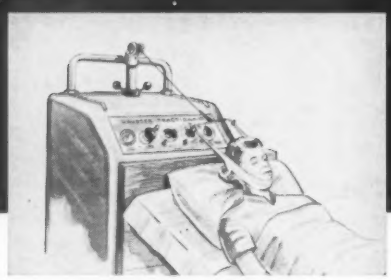

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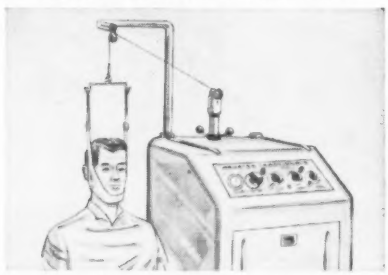

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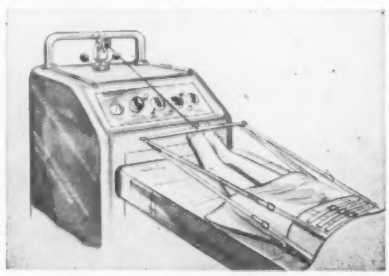

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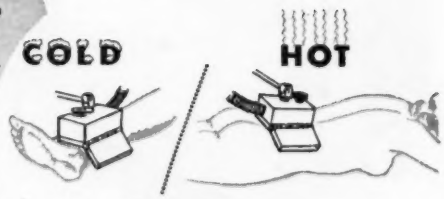

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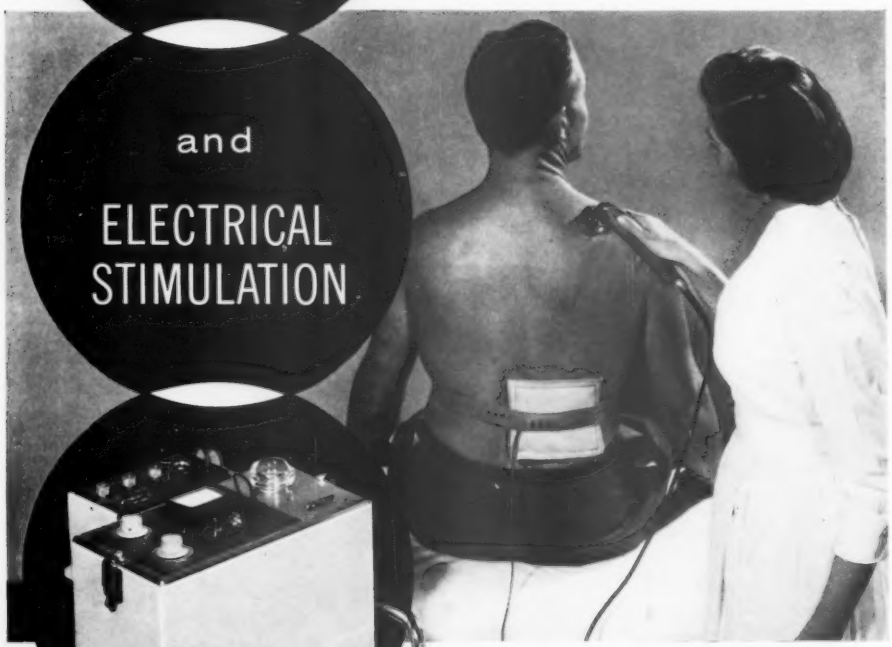

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Height and Weight of Children with Cerebral Palsy and Acquired Brain Damage

Harold M. Sterling, M.D.
Brighton, Mass.

● Height and weight records of 100 patients with brain damage occurring prenatally, paranatally or in early childhood have been compared with those of the normal population at the same age, where possible. Data regarding the height and weight in the group with prenatal and paranatal brain damage (cerebral palsy) is less than would be expected. A small group of children acquiring brain damage later did not show as great differences from the predicted height and weight for normal individuals of the same age.

Method

Records of children treated at Illinois Childrens Hospital School, Minneapolis Curative Workshop Nursery School, and University of Minnesota because of "cerebral palsy" were reviewed. One hundred subjects were selected who had records in which height or weight was recorded with the subject's age in years and months at the time of determination. When these patients were classified according to the generally accepted terminology,[1] 40 had symptoms predominantly of spasticity, 55 had predominantly athetosis, and 5 had other diagnoses.[1, 2] The degree of involvement was severe in 50, moderate in 30, and mild in 20[2, 3] (table 1).

Maximum height and weight for younger children[4, 5] or height and weight at age 19 for older patients were recorded. Height and weight determinations were available for one or both parents in 37 instances and for 53 siblings, for a total of 125 family members without neurological disease.

The height and weight determinations of the subjects and of their siblings were recorded on anthropometric charts of the Childrens Medical Center, Boston,[6] for ages 6 months through 13 years. For subjects and siblings between ages 13 and 18 the height and weight were compared with the NEA-AMA (1949) percentile standards (figs. 1 and 2.)[7] In addition, subjects and siblings between ages 5 and

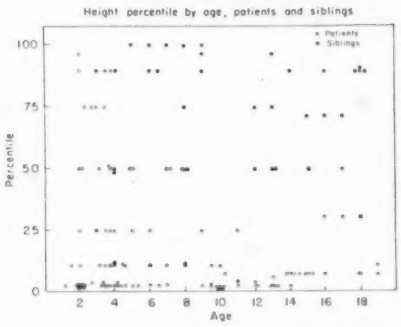

Fig. 1 — Percentile ranks of maximum height of patients (open circle) and their siblings (closed circle) grouped by age to 19 years.

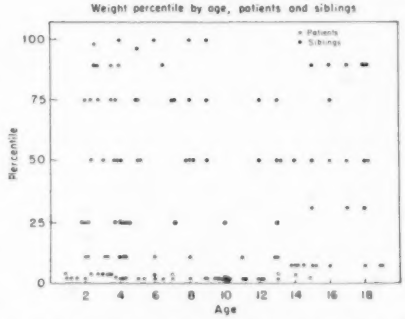

Fig. 2 — Percentile ranks of maximum weight of patients (open circle) and their siblings (closed circle) grouped according to age to 19 years.

Read at the Thirty-seventh Annual Session of the American Congress of Physical Medicine and Rehabilitation, Minneapolis, September 3, 1959.

Medical Director, Joseph P. Kennedy Jr. Memorial Hospital, Brighton; formerly, Instructor, Department of Pediatrics and Department of Physical Medicine and Rehabilitation, University of Minnesota Medical School, Minneapolis.

Table 1: Symptoms and Severity

	Mild	Moderate	Severe	Total
Athetoid	3	20	32	55
Spastic	15	8	17	40
Other	2	2	1	5
Total	20	30	50	100

18 were also evaluated by the Wetzel Grid for Physical Fitness.[8, 9]

Standard data of this type for adults are not available, since previously accepted standards are being revised.[10,11] Parents and siblings of adult age have been charted on a height-versus-weight chart to allow comparison at such time as these data become available (figs. 3 and 4).

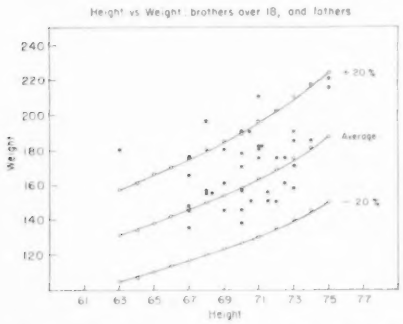

Fig. 3 — Height and weight of male family members over age 18 compared with average weight for height, young adult males.

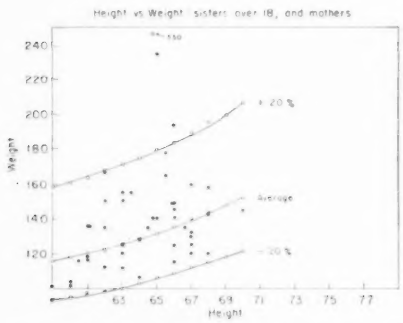

Fig. 4 — Height and weight of female family members over age 18 compared with average weight for height, young adult females.

Results

It became apparent as the records were transcribed to Wetzel Grids and Childrens Medical Center charts that the subjects with congenital or early-acquired brain damage tended to group in the shorter height and lighter weight areas, whereas siblings without involvement were scattered throughout the range but with a tendency toward greater height and weight than expected. Seventy-seven subjects with adequate records ranked below the 30th percentile of the charts for height (table 2). Seventy-three subjects with adequate weight records were found to rank below the 30th percentile for weight (table 3). Sixty-nine subjects showed heights of 10th percentile rank or less and 62 subjects showed weights of 10th percentile rank or less. Only 11 subjects had weights ranking greater than the 70th percentile, and 9 had heights ranking greater than the 70th percentile. By contrast, of 35 siblings in similar age groups, only 4 were below the 30th percentile for height; 5 were below the 30th percentile for weight. Twenty of the 35 normal siblings were found to have weights at or greater than the 70th percentile, and 23 showed height at or greater than the 70th percentile (tables 4 and 5). When recordings were made on the Wetzel Grid, 50 of the 55 subjects to whom this modality could be applied were in the smallest 33 percentile, whereas only 2 of 34 siblings were in this area.

As might be expected, severity of the neurological involvement correlated very well with the degree of shortness and lightness.[12] Impairment of self-help showed a similar correlation. The severity of impairment of speech showed a similar trend but did not show as great a correlation. No sex difference was demonstrable.

Acquired Brain Damage

Six patients with brain damage acquired in childhood later than the age 1 year but not more than 7 years who were studied at least 2 years after onset were found to differ somewhat from the group with onset earlier in life. Three patients had heights of 90th percentile rank or greater, and 4 had weights of 75th percentile rank or greater, in spite of the fact that the injuries had occurred 2 years, 3 years, 4 years, and 12 years previously, and the degree of disability was not significantly different from the larger group. It will be noted that 3 patients were below the 30th percentile rank in height and 2 in weight (table 6).

Table 2: Percentile Rank: Height

	Under 30	30-70	Over 70
Athetoid	47	5	2
Spastic	26	8	6
Other	4	0	1
Total	77	13	9

Table 3: Percentile Rank: Weight

	Under 30	30-70	Over 70
Athetoid	46	6	1
Spastic	23	8	9
Other	4	0	1
Total	73	14	11

Table 4

	% Having Weight of 10th Centile and Under	% Having Weight under 30th Centile	% Having Weight over 70th Centile
Subjects	62	73	11
Siblings	4	14	57

Table 5

	% Having Height of 10th Centile and Under	% Having Height under 30th Centile	% Having Height over 70th Centile
Subjects	69	77	9
Siblings	4	11	68

Table 6: Acquired Brain Damage

Patient	Percentile Height	Percentile Weight	Severity	Age at Onset, Yrs.	Duration, Yrs.
1	90th	75th	moderate	1	12
2	90th	97th	mild	5	3
3	90th	90th	moderate	7	4
4	25th	25th	severe	4	8
5	3rd	25th	moderate	5	3½
6	3rd	75th	severe	3	2

Discussion

Obviously the distribution of symptoms in this report (spasticity in 40, athetosis in 55, other in 5) is not comparable to that reported in surveys in which attempts were made to include all children of a given geographic area who had diagnoses of cerebral palsy.[2] The degree of disability is likewise different from the few reports using this distinction.[2, 3, 13] It must be pointed out that these patients represent a cross section of those referred between the years 1947 and 1955 for inpatient treatment at the Illinois Childrens Hospital School, and referred during the years 1956-59 for outpatient treatment at the Minneapolis Curative Workshop Nursery School, or for either inpatient or outpatient treatment during 1956-59 at the University of Minnesota Department of Physical Medicine and Rehabilitation. Thus, although not typical of the group at large, they are probably typical of the patients referred to a rehabilitation service.

Comparison of height and weight records of the siblings indicates that these

siblings tend to be larger and heavier than the sample population, as recent publications comparing current height-weight data with those of previous generations would lead one to expect. The shortness and lightness of the patients, when compared with recent data based on a large sample of a comparable population, are therefore even more marked when compared with these siblings, since there is evidence of genetic control of height and weight in children.[14-17]

Retardation of growth in children without neurological damage has been demonstrated secondary to malnutrition[16] or undernourishment[18] which is either primary or due to increased metabolic demand, severe acute infection, chronic infection,[19] locally decreased circulation,[20] and other factors.[17]

Many theories have been proposed to explain the apparent retardation of children with "cerebral palsy," one of which is that "growth centers" of the brain have been damaged.[3, 13] This is not an acceptable hypothesis in the absence of careful observations on fluid, calorie, and protein intakes,[16, 18] particularly since evidence of difficulty in feeding is frequently found during infancy and often later,[21, 22] and the degree of impairment of speech and self-help correlates well with the degree of growth retardation in this series. It is possible that the asymmetry of size of the limbs of hemiplegic children is related to brain damage, but the effect of relative inactivity has not been assessed.[23] The incidence of fevers and infection appears to be greater in this group than among normals,[3, 24] although satisfactory data are not available in this area. Another explanation is that the metabolic demands[22] in these patients are possibly greater than normal, but again adequate data concerning metabolic needs are not available. Premature birth, known to be associated with subsequent growth retardation[24-26] was a significant but not a major factor in the group investigated.

Summary and Conclusions

Height and weight data of a group of children having "cerebral palsy" have been compared with those of normal siblings and with those of patients acquiring brain damage later in childhood. The patients having congenital or early-acquired brain damage were found to be significantly shorter and lighter than would be expected, either by comparison with siblings or by use of standard anthropometric charts.

More careful studies of metabolic needs, intake, incidence of fever or infection must be made before there is a satisfactory explanation of these findings. The theory of damage to a presumed growth center or centers is a poor explanation in the absence of adequate data in other areas.

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Information relative to securing reprints of this study may be had by checking the Reader Service column on page iv of this issue.

We do not slip into happiness. It is strenuously sought and earned. A nation glued to the television screen is not simply at a loss before the iron pioneers of the new collective society. It isn't even having a good time. No society has ever spent as much as we do on drink and tranquilizers. Can one argue that this is evidence of universal fun?

— ADLAI STEVENSON

Medical and Vocational Evaluation of Young Adult Cerebral Palsied: Experience and Followup, 157 Cases

Shyh-Jong Yue, M.D.
and
Martin G. Moed, M.A.
New York City

● Since 1955, 157 young adult cerebral palsied patients have gone through a work classification and evaluation project. Through medical examination, activities of daily living tests in physical and occupational therapy, psychometric studies, speech and hearing evaluations, and psychiatric examinations were carried out as they entered. These patients were then subjected to vocational evaluation in a special cerebral palsy workshop for a period of seven weeks. Predictions were made as to employability: that of the 157 patients, 52 per cent would be employable; 14 per cent had borderline employability; and 34 per cent would not be able to enter the competitive labor market. In follow-up study of 126 cases, it was found that 56 per cent of the patients in the predicted employable group had over 25 per cent of employment during the follow-up period and that 94 per cent of the patients predicted to be unemployable were unemployed. Of the individual medical test factors measured, only the physical therapy activities of daily living was significantly related to the vocational accomplishment, but the composite of both the physical factors and mental factors was more predictive of success than any one factor. There was some evidence that a minimal predictive score may furnish a basis for realistic prediction of job chances, but many immeasurable individual and chance factors enter into the achievement of vocational success.

The Cerebral Palsy Work Classification and Evaluation Project was started at the Institute for the Crippled and Disabled in January, 1955. It is sponsored by United Cerebral Palsy of New York and Queens, and the Office of Vocational Rehabilitation of the United States Department of Health, Education, and Welfare. Other participating agencies are the New York State Employment Service and the New York State Division of Vocational Rehabilitation. In this project, an attempt is made to evaluate young adult cerebral palsy patients in order to predict their vocational potentials at unskilled, semiskilled, and clerical levels. A preliminary report on the predictive value of medical facts in this research was presented at the American Congress of Physical Medicine and Rehabilitation in 1956 and was subsequently published.[1] In that report, an analysis was made of a group of 44 cerebral palsy patients who completed both medical and vocational evaluation during the first year. Now at the end of three years, the series has grown from 44 to 157 patients whose evaluations have been completed, and the further test of subsequent vocational accomplishment is at hand in a large number.

The method of study was as follows:

I. Medical evaluation
  A. Medical examination
  B. Physical evaluation
    1. Activities of daily living (ADL) test in physical therapy
    2. ADL test in occupational therapy
  C. Mental evaluation
    1. Psychometric studies
    2. Speech and hearing examination
    3. Psychiatric and/or psychological examination
II. Vocational evaluation
III. Followup

General Considerations

Among the group, 111 (70.7 per cent) were males; 46 (29.3 per cent) were females. The youngest patient was 16 years of age and the oldest, 37. The average age of the group was 21.7 years.

Educational background was generally poor (table 1). The athetoid quadriplegics reached a higher educational standing, 11 per cent of this group having had a college education. Only one third of the entire group completed high school and but 5 per cent attained a college education.

Medical Evaluation

In this series, the patients are classified into six groups by type of cerebral palsy instead of the four groups of the first series (table 2). The athetoid quadriplegics were predominantly athetoids with all four extremities involved; the spastic

Read at the Thirty-seventh Annual Session of the American Congress of Physical Medicine and Rehabilitation, Minneapolis, September 4, 1959.

Assistant Attending Physician, Physical Medicine and Rehabilitation, Presbyterian Hospital; Assistant Professor, College of Physicians and Surgeons, Columbia University.

Coordinator, Cerebral Palsy Work Classification and Evaluation Project, Institute for the Crippled and Disabled.

Table 1: Educational Background

Attainment	No. of Patients	Per Cent
College education	8	5
Grade 12 to high school graduation	57	36
Grade 8 to 11	63	40
Grade 1 to 7 and CRMD* class	29	19
Total patients	157	100

*Children with retarded mental development

Table 2: Classification of Cerebral Palsy

Diagnosis	No. of Patients	Per Cent
Athetoid quadriplegia	56	36
Spastic hemiplegia	49	31
Spastic diplegia	26	17
Spastic quadriplegia	17	11
Ataxia	7	4
Brain damaged	2	1
Total patients	157	100

hemiplegics showed evidence of spasticity involving the upper and lower extremities on the same side; the spastic diplegics had all four extremities involved, with more spasticity of the lower extremities than the upper; the ataxics were those who had disturbance in position sense and balance. Two cases were diagnosed as brain damage because no typical pattern of motor involvement was shown. Where both spasticity and athetosis were present, the most predominant manifestation was the basis of classification.

Physical Evaluation

ADL Test in Physical Therapy. The ADL test in physical therapy determines ambulation, elevation activities, and ability to travel (table 3). Great emphasis was placed on the ability to travel to and from work, and those who were unable to travel were severely downgraded. It was found that 84 per cent of the patients in this series were capable of traveling alone. One patient, a severely involved athetoid quadriplegic whose gait was very unsteady with two crutches, could, however, when he was helped into a car, drive unaccompanied. In this and in subsequent test ratings, a scale of 1 to 5 is used, the highest number indicating the least impairment.

ADL Test in Occupational Therapy. Here, the test includes self-care activities and manual dexterity (table 4). The

Table 3: Activities of Daily Living Test in Physical Therapy

	Rating	No. of Patients	Per Cent
5	Independent without support, travel alone	100	64
4	Independent with support, travel alone	31	20
3	Independent with or without support, does not travel alone	23	14
2	Dependent, requires assistance in ambulation and elevation activities	3	2
1	Dependent in both ambulation and elevation activities	0	0
	Total patients	157	100

Table 4: Activities of Daily Living Test in Occupational Therapy

	Rating	No. of Patients	Per Cent
5	Complete self-care with good manual dexterity	35	22
4	Spotty deficit in self-care and manual dexterity	56	36
3	Moderate deficit in self-care and manual dexterity, or one-handed	59	37
2	Dependent in self-care, and poor manual dexterity	7	5
1	Completely dependent	0	0
	Total patients	157	100

Table 5: Psychometric Studies

	Rating	No. of Patients	Per Cent
5	Superior and high average (IQ 110 and over)	5	3
4	Average (IQ 90-109)	39	25
3	Low average (IQ 80-89)	39	25
2	Borderline (IQ 70-79)	35	22
1	Retarded (IQ 69 and under)	39	25
	Total patients	157	100

ability of patients to use both hands in a working situation is an important consideration. If the patient were essentially one-handed, even though self-sufficient in activities of daily living, he was downgraded appropriately. Only 22 per cent of the group were found to have nearly normal hand skill; 73 per cent had some degree of hand involvement. The spastic hemiplegics suffered greatly in rating when their involved hand was unable to perform any functional activity.

Mental Evaluation

Psychometric Studies. In these studies, the Wechsler-Bellevue Test of Intelligence, Form I, was utilized (table 5). It was found that 28 per cent of the patients had average to superior intelligence, the athetoid quadriplegics rating higher than the others; 25 per cent were considered to be mentally retarded.

Speech and Hearing Evaluation. The speech and hearing evaluation was complicated (table 6). A hearing loss constitutes a serious handicap for a vocational potential, but the use of a hearing aid may remedy the situation. For simplification, speech evaluation was used as the chief index; however, a further penalty or downgrading was added for an uncompensated hearing loss. Among the group, 57 per cent were found to have good hearing and intelligible speech; 33 per cent had moderately affected speech and most of these were recommended for speech therapy; the remaining 10 per cent were badly affected.

Psychiatric and/or Psychological Examination. Each patient was examined by a competent psychiatrist and/or psychologist, and his adaptive behavior was analyzed (table 7). Only 5 per cent of the group were found well adjusted; 58 per cent were immature and unrealistic; 34 per cent displayed some impairment of judgment and psychotherapy was recommended for most of them; 3 per cent showed marked behavioral problems.

Table 7: Adaptive Behavior

	Rating	No. of Patients	Per Cent
5	Well adjusted	8	5
4	Immature and unrealistic	92	58
3	Emotionally disturbed, requiring psychotherapy	53	34
2	Marked behavior problem	3	2
1	Psychotic behavior	1	1
	Total patients	157	100

Vocational Evaluation

Vocational evaluation was carried out in a special cerebral palsy workshop. This evaluation was divided into two phases: initial evaluation and job exploration. In the initial evaluation, the following skills were tested: (1) Performance with the hands (manual dexterity), (2) perform-

Table 6: Speech and Hearing Evaluation

	Rating	No. of Patients	Per Cent
5	Normal speech; normal hearing	36	23
4	Speech slightly affected but intelligible; hearing threshold elevated or normal	53	34
3	Speech moderately affected requiring speech therapy; mild hearing loss	52	33
2	Speech severely affected and nonintelligible; marked hearing loss	14	9
1	Speech unintelligible; severe hearing loss	2	1
	Total patients	157	100

Table 8: Predictions Made at Conclusion of Vocational Evaluation

	Rating	Total Sample		Followup Group	
		No. of Patients	Per Cent	No. of Patients	Per Cent
5	Placeable with/without training in semiskilled work	54	34	35	28
4	Placeable in unskilled work	28	18	25	20
3	Placeable after training in unskilled work	22	14	19	15
2	Sheltered workshop	48	31	42	33
1	No recommendation	5	3	5	4
	Total patients	157	100	126	100

Table 9: Followup Status Compared with Vocational Evaluation — 126 Patients

Vocational Rating	Number of Patients "Employed"			No. of Patients "Unemployed"
	76-100% Employment	51-75% Employment	26-50% Employment	
5	14	4	3	14
4	5	5	8	7
3	3	1	1	14
2	0	1	1	40
1	0	0	0	5
Total patients	22	11	13	80

ance with basic tools and measuring instruments, (3) performance with power tools and vocational equipment, and (4) performance in basic academic ability. In job exploration, the patient was given an opportunity to practice his best skill over an extended period of time. In the vocational evaluation unit, jobs were duplicated in as authentic a manner as possible. At the conclusion of the seven-week vocational evaluation, a prediction for employment was made on each client. Of 157 patients, it was predicted that 52 per cent would be employable in semiskilled or unskilled work, and 14 per cent, after training, in unskilled work (table 8). Normally, unskilled work does not require much training; therefore, the latter group is actually borderline in employability; 34 per cent were judged to be unemployable.

Followup

To be included in the follow-up group in this study, the person had to be in the labor force, that is, either working or ready to work, for at least nine months. According to this criterion, 126 of the 157 patients are included. Thirty-one are excluded for the following reasons: 2 failed to report for followup, 19 were still in training or went back to school, and 10 were less than 9 months in the labor force. These 126 patients had been in the labor force from 9 to 42 months. Table 8 shows the results of their initial vocational evaluation in terms of vocational prediction made at the conclusion of a 7-week evaluation period on a 5-point scale.

In judging vocational success at follow-up, those who have worked 25 per cent or more of the period of followup are considered employed, and so designated. Those employed from 0 to 25 per cent of the follow-up time are grouped with those working in sheltered workshops and considered unemployable. From table 9 it will be seen that of the 79 patients who had a vocational rating of 3, 4, or 5, 44 (55.7 per cent) found employment. Of 47 patients having a vocational rating of 1 or 2, only 2 (4 per cent) found employment. A biserial correlation between vocational rating and actual employment is 0.69. This relationship is significant at less than the 1 per cent level. In the group of 46 patients with a history of employment, 18 patients (40 per cent) worked in semiskilled jobs, such

as office clerk, office machine operator, mail clerk, machine tender, and sewing machine operator, and 28 patients (60 per cent) worked in such unskilled jobs as elevator operator, attendant, stock clerk, assembler, and messenger. About one third of this group obtained their jobs through the New York State Employment Service, and 40 per cent through personal arrangements.

The next point is to test the validity of the various medical and psychological evaluation tests in predicting eventual employment. As already indicated, the total population was divided into two groups. Those patients who had worked a minimum of 25 per cent to a maximum of 100 per cent were classified as employed; all others were in the unemployed group. Using this criterion of employment, 46 patients (36.5 per cent) fell in the group considered employed and 80 (63.5 per cent) were classified as unemployed. Each of the factors in evaluation was then correlated with the dichotomous criterion using a biserial correlation (table 10). It will be seen that intelligence quotient (IQ), speech and hearing, and adaptive behavior are not alone significantly related to employment. However, when these three variables of five grades each are totaled, giving a possible maximal score of 15, a low but positive correlation is found with employment, which is significant at the 5 to 6 per cent level. The physical therapy ADL score (table 3) is correlated .294 with employment, which is significant at the 1 per cent level. The occupational therapy ADL score (table 4) has a very low correlation and no significance is noted. However, when these two factors are totaled, giving a maximal score of 10, the correlation of the two is higher than the physical therapy ADL score alone. The combined physical score has a .319 correlation, which is significant at the 1 per cent level. Totaling the physical and mental scores, it is found that the correlation with employment was .33 and again significant at the 1 per cent level; also, slightly higher than the combined physical score alone.

Table 10: Significance of Employability from Factors in Medical and Vocational Evaluation

Factor	γb	σrb	t	Significance Level, %
IQ	.107	.113	.95	. .
Speech and hearing	.146	.112	1.30	. .
Behavior	.159	.112	1.42	. .
Mental total	.215	.110	1.95	5-6
Physical therapy ADL	.294	.106	2.77	1
Occupational therapy ADL	.175	.111	1.58	. .
Physical total	.319	.105	3.04	1
Mental and physical total	.330	.104	3.17	1
Vocational	.689	.072	9.57	1

Table 11: Employment Compared with Physical and Mental Scores — 126 Patients

Physical Score	Mental Score 5-8 Per Cent Employed	Mental Score 9-11 Per Cent Employed	Mental Score 12-15 Per Cent Employed	All Mental Scores Per Cent Employed
9-10	31	52	64	50
7-8	33	29	33	30
5-6	13	17	0	13
All physical scores	27	36	56	37

Table 11 expresses somewhat differently the relationship between medical evaluation scores and employment success. It is designed to illustrate the interdependence and sometimes the independence of the physical and mental scores by dividing each of these into three ranges. It can be seen that a low physical score, regardless of mental score, results in a low employment record; only 13 per cent of those with a physical score of 5 to 6 points found employment. Thirty per cent of those with a 7 to 8

point physical score found employment; here again, the mental score does not seem to affect employment. With a physical score of 9 to 10 points, it was noted that 50 per cent found employment. In this group, the mental score apparently influences employment; those with a mental score of 5 to 8 points had 31 per cent employment, those with 9 to 11 points had 52 per cent employment, and those with a 12 to 15 point mental score had 64 per cent employment.

Discussion

The determination of actual vocational success of a group of 126 cerebral palsy patients adds considerably to the significance of any predictive index. The high degree of correlation found between employment success and vocational evaluation is encouraging and supporting to the validity of careful practical vocational evaluation.

A previous presentation dealt only with the relationship between evaluation testing in physical and psychological areas and the results of vocational evaluation testing. Then, the various physical and psychological tests were grouped in a single index. For what seemed to be logical *a priori* grounds, the intelligence quotient and manual dexterity as determined by occupational therapy ADL tests were weighted at twice the other factors. Rough correlation of this index with vocational evaluation scores was found, but more thorough testing of its validity was reserved for the present study in which a larger series is available and actual vocational success can be measured. In the present study, emphasis is on the predictive value of individual tests and of composite scores, without arbitrary weighting; in fact, statistical analysis shows no advantage to weighting of any of the factors measured.

Among the individual factors, the physical therapy ADL test, which in effect measures the ability to travel to and from a job and to be mobile on a job, was found to have higher correlation than any other single factor, either mental or physical. The occupational therapy ADL test, as a measure of hand skill, does not seem to be correlated with the mere fact of employment, but may well have an influence on the degree of skill achieved. It should be noted that, in the present study, 60 per cent of the jobs were at a low level of skill and so, in all likelihood, the importance of manual dexterity was not brought out. It is of some interest that although none of the components in the mental score correlate highly with vocational success, a composite of them is correlated at a 1 per cent level. It would follow, perhaps, that a composite of more tests of this nature would correlate even more highly and would fit into the commonly accepted axiom that multiple psychological evaluations are usually necessary for valid prediction. For the same reason, it is not surprising that the combined score on both the mental and physical tests shows a more significant correlation than any one test or smaller combination.

There is a suggestion, not wholly validated statistically, that physical competence, particularly in ambulation, is the prime necessity for successful employment; that among the severely physically handicapped, mental scores are relatively unimportant; and that only among the physically competent do the mental aspects become really important.

That the correlation of physical and mental factors with employment is not higher is not surprising in view of the many factors which influence the getting of a job, among them being matters of chance, intangible characteristics of personality, associated defects such as perceptual and sensory disturbances, or peculiarities of the environment. As might be expected, the vocational prediction, which includes evaluation of the patient in an actual job situation, is higher than other specific factors. During the year 1957-58, there was a period of recession and it was difficult for these patients to find jobs; had there been industrial expansion, no doubt the placement record would have been higher.

Proper preparation of these young cerebral palsied adults is extremely important. The majority of this group had been discharged from other cerebral palsy clinics before entering this evaluation project, yet many were helped further by

therapy to improve ambulation, ability to travel, and manual dexterity, especially when it was designed to further a specific vocational goal.

Summary

Since 1955, 157 young adult cerebral palsied patients have gone through a work classification and evaluation project. Through medical examination, activities of daily living tests in physical and occupational therapy, psychometric studies, speech and hearing evaluations, and psychiatric examinations were carried out as they entered. These patients were then subjected to vocational evaluation in a special cerebral palsy workshop for a period of seven weeks. Predictions were made as to employability: that of the 157 patients, 52 per cent would be employable; 14 per cent had borderline employability; and 34 per cent would not be able to enter the competitive labor market. In follow-up study of 126 cases, it was found that 56 per cent of the patients in the predicted employable group had over 25 per cent of employment during the follow-up period and that 94 per cent of the patients predicted to be unemployable were unemployed. Of the individual medical test factors measured, only the physical therapy activities of daily living was significantly related to the vocational accomplishment, but the composite of both the physical factors and mental factors was more predictive of success than any one factor. There was some evidence that a minimal predictive score may furnish a basis for realistic prediction of job chances, but many immeasurable individual and chance factors enter into the achievement of vocational success.

Reference

1. Yue, S-J; Moed, M. G., and Darling, R. C.: Prevocational Medical Evaluation of Young Cerebral Palsied Adults. Arch. Phys. Med. **38**:283 (May) 1957.

Information relative to securing reprints of this study may be had by checking the Reader Service column on page iv of this issue.

There are eight requisites for contented living:
Health enough to make work a pleasure;
Wealth enough to support your needs;
Strength to battle with difficulties and overcome them;
Grace enough to confess your sins and forsake them;
Patience enough to toil until some good is accomplished;
Charity enough to see some good in your neighbor;
Faith enough to make real the things of God;
Hope enough to remove all anxious fear
concerning the future.

—JOHANN WOLFGANG VON GOETHE

Chronic Physical Illness as Threat

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● Ever since the concept of man as a psychobiological unit has been accepted, medical workers have found it necessary to seek explanations from psychiatrists, psychologists, and social workers for the behaviors of their patients. All too frequently, physical illness often serves the purpose of gaining satisfaction for security needs and other psychosocial wants without any special stigma or shame being attached to the sick person's behavior or to his feelings about himself. This study points up empirical evidence of the fact that personal values of the physically disabled are not always primarily concerned with getting well, even though the disabled do tend to be somewhat more concerned with physical functioning than do healthy persons.

It is becoming increasingly clear that an adequate explanation of people's responses to physical illness is not forthcoming from the isolated study of the physiological processes of disease. Ever since the acceptance of Adolf Meyer's concept of man as a psychobiological unit, medical workers have found it increasingly necessary to seek explanations for their patients' behaviors from psychiatrists, psychologists, and social workers. In formulating their explanations, workers in these fields have uncovered many provocative leads to formal research and theory construction. In a previous article,[1] we have recently attempted to formalize the thinking in this area by presenting the logic of a theory designed to explain human reactions to discomfort, pain, and death.

It is now desirable to recapitulate certain aspects of this theory, to report the findings of certain relevant research projects, and to discuss some practical implications of the findings.

Theoretical Background

The theory borrows heavily from the original ideas of Kurt Lewin[2-4] and A. H. Maslow,[5-9] and its basic model is a psychobiological construction called the *Total Structure*. The *Total Structure* is defined as a system of cyclical energy relationships (regions) which is entirely open with respect to the traditional organism-environment distinction. That is, it regards the human being as an organized, dynamic composite, which reacts to both "inner" and "outer" forces; and it draws no rigid boundary around the person as a physical entity, distinct from the people and objects which constitute his environment. In fact, the term *Total Structure* is equivalent to the term "individual" in the present theory. The aspect of *Total Structure* functioning which is particularly relevant to this discussion is its response to threat. Threat is defined as any prevention of the completion of energy cycles within the open-system individual. The intensity of threat is measured by the amount of energy which is blocked from expression in the *Total Structure.*

But the amount of energy which is blocked is a function of at least two things: first, the degree of availability of compensatory regions through which blocked energy may escape; and second, the psychobiological importance of the threatened region itself (as defined by a hierarchy of region priorities). The theory states that any threat to a specific region is responded to by the entire *Total Structure* and is dealt with either through compensation or through the sacrifice of less important regions until sufficient energy becomes available to overcome the threat or to hold it in dynamic equilibrium.

Threats are conceived to be of two types, active and passive, a distinction first suggested by Saul Rosenzweig.[10] Active threats are those which impose increasing danger to the individual if not neutralized in some way (like rising flood waters). Passive threats are those which obstruct certain behaviors but which offer resistance only when energy is directed against them (like a stone wall).

Theoretically, the special situation of the person with a chronic physical illness is approximately this: the individual is blocked by his disability from engaging in behaviors (energy exchanges) which

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are dependent upon the affected portions of his body. The illness is an active threat to the person to the extent that he attempts to overcome it directly and sacrifices his higher-level development to this end. It becomes a passive barrier when compensatory behaviors are made available for the establishment of new avenues of expression.

Research

The theoretical position just described leads to a number of deductions, one of which formed the basis for a specific research project. The study was concerned with the effects of chronic illness upon the expressed importance of the physical body to the individual. The theory also provided a basis for interpreting the results of another investigation, which was concerned with measuring the body image of chronically ill persons.

The theory states that threat to body regions of the *Total Structure* leads to an increase of energy flow into relationships which depend upon the functioning of the body. This increase is accomplished by sacrificing energy invested in other regions, at lower levels of psychobiological demand. It was reasoned that this state of affairs should be manifested in a measurable tendency on the part of the threatened individual to exhibit increased concern over bodily things at the expense of his concern for nonbody functions. The increased investment of energy in body relationships should, therefore, be reflected in a pattern of personal values which stresses the importance of body functioning as opposed to psychosocial functioning. This hypothesis was tested with a personal values scale designed to measure values on two types of items; those representing physical senses, capacities and skills, and those representing psychosocial objects and ideals. All the items are reproduced in table 1; type P items are the physical items and type PS are the psychosocial items. In all there are 24 items, divided into two equivalent forms (A and B), each form equally balanced for the physical and psychosocial factors. The 12 items in each form were presented to the subject in 12 pentads, the subject being required to rank the items in each set according to their relative personal value to him. This method was chosen in preference to traditional ranking technics for three reasons: (1) it provided repeated measures on each item and lent itself to the calculation of ranking consistency values; (2) direct ranking of the 12 items of a given form was found in earlier research to be too difficult for many subjects; and (3) it provided assurance that each item was considered in relation to all other items, since pentads were so constructed as to include at least two presentations of all possible item pairs.

Table 1: Personal Values Scale Items*

Item Type	Scale Form	Item	Composite Rank
PS	A	Sanity	1
PS	B	Ability to think	2
P	A	Use of entire body	3
P	B	General physical health	4
P	B	Use of body from neck down	5
P	B	Vision	6
PS	B	Children	7
P	A	Ability to walk	8
P	A	Ability to talk	9
PS	A	Parents	10
PS	A	Self-control	11
PS	B	Home	12
PS	A	Religion	13
PS	B	Freedom	14
P	B	Hearing	15
P	A	Physical independence from others	16
PS	B	Ability to love someone	17
PS	A	Education	18
P	B	Control of bowels	19
PS	A	Country	20
P	A	Control of bladder	21
PS	B	Job	22
P	A	Sexual capacities	23
P	B	Physical attractiveness to others	24

*The order in which the items are presented reflects the composite value pattern of the research subjects.

The score for each item was the total of the ranking values given to that item by the subject. Each item appeared a total of five times in the 12 pentads. Naturally, since the number of rankings was fixed, each subject's total score was

the same as every other subject. The distribution of the item scores making up this total was of primary concern and yielded the "value patterns" of the subjects.

The scale was administered to a group of 31 chronically ill persons and to a group of 42 physically healthy persons. The factors of age, sex, and verbal intelligence were controlled in the analysis of the data, the details of which will not be presented here.* The results supported the hypothesis that the pattern of personal values of the chronically ill would show a relative emphasis upon the importance of bodily things as opposed to psychosocial things, but only as a general statement applicable to the groups of subjects considered as a whole. The following items were found to be significantly more highly valued by the chronically ill group than by the physically healthy group:

1. Use of body from the neck down.
2. Control of bladder.
3. Ability to walk.

The following items were found to be significantly more highly valued by the physically healthy group than by the chronically ill group:

1. Education.
2. Ability to love someone.
3. Children.
4. Religion.
5. Sexual capacities.

When the responses of individual subjects to individual items were analyzed, however, it was found that a common value pattern existed for all persons, irrespective of medical condition. In this pattern (see table 1) psychosocial and physical items tended to be heavily intermingled and group trends could scarcely be discerned. Despite the over-all differences, therefore, the correlations between all subjects and the basic value pattern tended to be remarkably high. This finding tends to confirm the notion that the human being does not identify himself as a primarily physical person wandering alone in a psychologically distant environment, but as a totality to whom emotional attachments are frequently more important than physical health.

The second investigation studied the effects of chronic physical illness upon the body image; 48 patients and 24 healthy controls were employed in the study. The body image task consisted of requiring each subject to adjust the linear distance between two visually perceived points to correspond to the distance between two points indicated on his body; the subject was prevented from seeing any portion of his body below the neck. Three different stimulus sizes were distributed among 18 body-region combinations, with a sampling of left unilateral, right unilateral, and bilateral areas equally balanced throughout. The factors of age, sex, intelligence, and visual perceptual disturbance were controlled. The results indicated that chronic illness tends to result in a significant constriction of the body image, that is, judgments about distances between various body parts tended to be smaller in the chronically ill subjects as compared to the physically healthy subjects. There was also evidence that the constriction was positively related to the degree of severity of the illness. Along with the constriction, found to be associated with the chronic illness, there was also found to be an increased variability in the responses, that is, a loss of stability of the body image.

Theoretical Implications

The results of these two investigations have some interesting implications for the understanding of the psychological changes associated with chronic disease. The damage to the body imposed by illness evidently results in some sacrifice of psychosocial functioning and in a shift in emphasis of personal values upon body functioning by the patient. At the same time, the patient tends to perceive his body as smaller in size, and with less clarity, than does the healthy person. It is consistent to infer that the individual deals with the threat of illness by investing energy in body relationships as an attempt to overcome the threat, and, at the same time, that he attempts to minimize the threat by psychologically

*Complete details of the analysis, as well as a description of the sample composition, may be obtained directly from the authors. Write c/o Highland View Hospital, 3901 Ireland Drive, Cleveland 22, Ohio.

constricting his body. To speculate on this second inference, the disabled person may see the source of threat as either *external,* in which case he attempts to defend himself by reducing the body's exposure to the threat, or *internal,* in which case he attempts to diminish the actual locus of the threat.

Another implication of the results from the body image study pertains to possible parallel changes in the over-all self-concept. Since the chronically ill individual's body image represents only one aspect of his self-concept, the constriction and loss of stability of the body image may be a symptom of a broader constriction and loss of stability of the self-concept. With respect to possible future research, the former change (constriction) might be reflected in an overall decrease in the actual number of regions (energy relationships) which are highly valued by the individual; the latter change (loss of stability) might be reflected in an increased tendency for personal values to fluctuate over time.

Practical Implications

There are several practical implications of the present view of chronic physical illness. The first of these is that it is quite probable that many patients are actually less concerned with the isolated end of obtaining a physical "cure" than most of us wish to believe. Often, to the physician, the physical goals of treatment are of primary importance; and the physician may find it difficult to understand how some patients may appear to be so callous or negligent about the outcome of their diseases. As the study of personal values demonstrates, however, the basic balance of personal values between psychosocial and physical factors is only slightly disturbed by chronic physical illness. (For example, most subjects consider it more important "to be able to think" than "to keep one's general physical health.")

The differences between ill and healthy people, though in the predicted direction and thus of theoretical significance, are far smaller, from a practical point of view, than even the investigators had anticipated. The answer to the physician's difficulty may well lie in the fact that what he perceives to be the end of the process (a physical state approximating health) may be, to the patient, only a means to another end, that of pursuing his personal values. When a state of illness furthers these values for the patient more advantageously than would a state of health, it is then quite logical for him to prefer the former.

It is not difficult to find illustrations of these points. A very common occurrence at our institution, for example, is for patients to worry excessively about their state of mental health. It is especially common for patients who have suffered cerebral vascular accidents to be concerned that they have "gone crazy" or that doctors consider them to be insane. The anxiety apparently arises from the patient's recognition of his diminished intellectual efficiency and his decreased capacity to control and organize his own thinking as well as he could before he became ill. As is demonstrated in our studies, concern over sanity touches upon a very significant personal value, for both healthy and chronically ill people. Fear or conviction of loss of a capacity which is so important may be devastating in its consequences and can seriously impede the process of rehabilitation, especially if no evidence to the contrary is ever offered to the patient. Both clinical experience and the findings of our research support the contention that physical rehabilitation cannot proceed effectively while issues such as this are at stake in the patient's own view of his condition. The patient's anxiety is often great enough that he hesitates even to mention his concern. Therefore, his fears are not always overtly expressed. Fortunately, however, we have found that patients who have this type of fear are often greatly and obviously relieved by a firm statement from a respected authority figure, such as the physician, to the effect that "you are not mentally ill, you are physically ill; you are not losing your mind, this is part of your physical disease."

Other examples may be drawn from cases in which the patient removes himself from a treatment situation against

medical advice before maximum benefit has been gained. Very frequently the problem behind such refusals to accept care is that of personal values which conflict with those of the hospital or the individual physician. This was most obvious in a case at our institution in which the patient, who had multiple sclerosis, felt that the most important thing in the world for him to do was to go out and find a job. He could not even face the medical examinations which might establish beyond any question the existence of his physical disability, even though it was apparent to anyone that this patient was already severely disabled and unemployable. He left the hospital within 48 hours of his admission. Clearly, this man could not give up his "self-picture," which was founded primarily upon psychosocial values, and which prevented him from facing a reality that would force him to give up those things more important to him than physical health.

A third group of cases is that in which the patient finds it more to his advantage to be disabled than to be physically healthy. Specific examples need scarcely be delineated, since this type of reaction is known to almost all who have worked with the physically disabled. As has been pointed out all too frequently, physical illness often serves the purpose of gaining satisfaction for security needs and other psychosocial wants without any special stigma or shame being attached to the sick person's behavior or to his feelings about himself. Illness itself may serve as a punishment for infantile behaviors and as a means of engaging in exactly those behaviors. These propositions are accepted by virtually all who work with the "symptom exaggerator," the "conversion hysteric" or the "hypochondriac." A physical disability may even be a source of pride, as in the case of the patient who identified herself with Job and felt that her disease was a mark of special selection by God for trial by physical suffering.

The present frame of reference leads us to suggest that, in most cases of this type, it will be seen that for the patient to give up the illness would require that he also give up certain psychological benefits, in the form of self-esteem, security, withdrawal from the harsh realities of the world at large, and so forth, and that these psychological benefits are, in the individual case, more important than physical health itself.

It goes against medical ethics not to treat a patient for a physical disability, when treatment is possible; thus, it is difficult for many physicians to see that the prolongation of life is not always what the patient himself wants. We do not wish to complicate the issue by entering into a prolonged discussion of medical ethics; we do wish to make the point that, from a practical point of view, it is not always possible to impose this ethical structure upon a patient whose values conflict with those of the profession of medicine. Sudden changes in a patient's values are not always possible, and it behooves us to be aware of those situations in which literally nothing can be done until the patient himself expresses a wish for medical assistance of the type offered by the institution or the individual physician. It is not the purpose of this paper to discuss methods of change as such. Our purpose is only to bring to light empirical evidence of the fact that personal values of the physically disabled are not always primarily concerned with getting well, even though the disabled certainly do tend to be somewhat more concerned with physical functioning than do healthy persons. Their values, over-all, are much the same as those of a non-disabled group, and are not as subject to radical change as one might suppose. It remains only to be emphasized that appeals to the patient's desire to get well are, at best, short-sighted; for getting well is only a part of the patient's *Total Structure*, and it is his entire *Total Structure*, not his body alone, which determines his attitude toward medicine or anything else.

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Information relative to securing reprints of this study may be had by checking the Reader Service column on page iv of this issue.

COOK COUNTY COURSE

The Cook County Graduate School of Medicine announces a two-week intensive course in Neuromuscular Diseases of Children with Special Emphasis on Cerebral Palsy, to be given by Dr. Meyer A. Perlstein for the period of June 20 to July 1, 1960. This is an intensive didactic and clinical course designed for physiatrists, pediatricians, orthopedists, neurologists, and psychiatrists interested in the care and treatment of children with neuromuscular handicaps. Emphasis will be placed on the practical clinical aspects of treatment and rehabilitation procedures. The course will include trips to demonstration clinics and treatment centers. The fee for the course is $250. Since registration will be limited, applications should be made as far in advance as possible. For further information, write to:

JOHN W. NEAL, Registrar
Cook County Graduate School of Medicine
707 S. Wood St., Chicago, Illinois

The tragedy of old age is not that one is old,
But that one is young.

—OSCAR WILDE

A Modified Coaxial Electrode for Electromyography

Robert O. Becker, M.D.
and
John T. Chamberlin
Syracuse, N. Y.

● A modification of the standard coaxial electrode is presented along with investigation of its electrical parameters. This type of probe has been in use for two years and has been found to offer advantages such as reproducibility of results; complete coaxial shielding throughout; durability and handling ease; cold sterilization is easily accomplished and efficient, as well as ease of manufacture. The design produces an exceptionally convenient and durable electrode and eliminates the variables produced by frequent replacement of the standard type.

The concentric or coaxial needle electrode as first described in 1929 by Adrian and Bronk[1] has remained essentially unchanged until the present.[2] This type of electrode has been found to be superior to the unipolar and the surface types in selectivity, frequency response and noise level[2, 3] (fig. 1). The usual method of construction (commercial and otherwise) involves the cementing of the amplifier lead in wires directly to the central conductor and the needle itself. This produces a bulky, difficult to handle unit with the further disadvantage that the maximum strain and flexure occurs at the base of the needle. We have found that breakage of the leads at this point will produce irregularity of results and intermittent short circuits. The average life of a probe of this type is a few months under clinical usage. We have further noted that results obtained with one coaxial electrode are not directly comparable to those obtained with another due to unavoidable variation in manufacture; i.e.: area of central conductor exposed, degree of bevel, and variations in inherent capacity. It therefore became desirable to produce a rugged, durable type of electrode, retaining the coaxial feature, that could be used clinically for long periods of time. With such an electrode results from one patient to the next or in multiple determinations within the same patient would be directly comparable. The variables encountered by using several electrodes or having to discard unserviceable electrodes would be obviated. The authors feel that with the increasing clinical usage of electromyography, standardization of procedures, technics and equipment is required to produce precision in determinations. A modification of the standard coaxial electrode is presented (fig. 2 and 3) along with an investigation of its electrical parameters. This type of probe has been in use in this laboratory for two years and has been found to offer the following advantages:

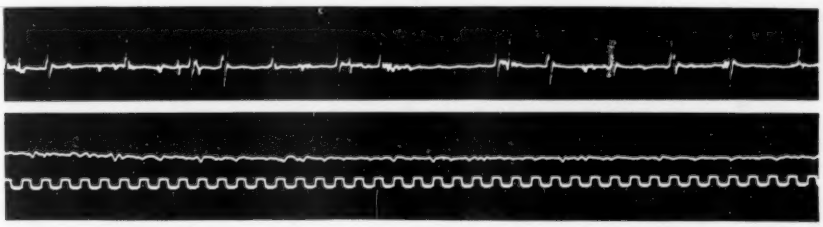

Fig. 1 — Comparative electromyograms obtained simultaneously from the vastus lateralis muscle. Upper trace was obtained with the modified coaxial electrode; the lower trace with a bipolar, silver electrode with 6" spacing. Note the small area of "read out" from the coaxial type and the failure of the surface electrode to pass the high frequency components of the wave forms. Calibration signal 60 cps and 100 micro volts amplitude.

1. Reproducibility of results. The same probe may be utilized for multiple

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Assistant Professor of Orthopedic Surgery, State University of New York, Upstate Medical Center; Chief, Orthopedic Service, VA Hospital.
Project Engineer, Heavy Military Department, General Electric Company.

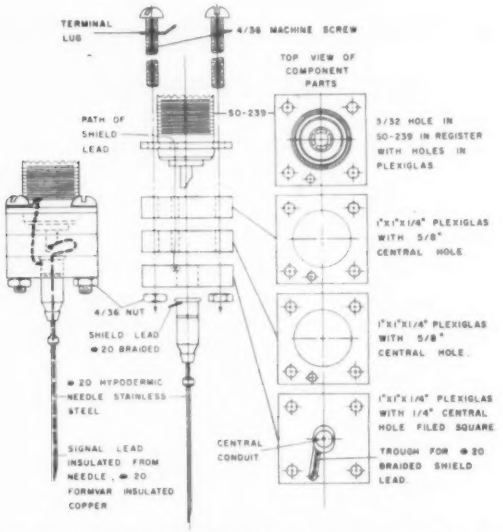
TERMINAL LUG
4/36 MACHINE SCREW
TOP VIEW OF COMPONENT PARTS
PATH OF SHIELD LEAD
SO-239
3/32 HOLE IN SO-239 IN REGISTER WITH HOLES IN PLEXIGLAS
1"x1"x1/4" PLEXIGLAS WITH 5/8" CENTRAL HOLE
4/36 NUT
SHIELD LEAD ⌀20 BRAIDED
1"x1"x1/4" PLEXIGLAS WITH 5/8" CENTRAL HOLE
⌀20 HYPODERMIC NEEDLE STAINLESS STEEL
1"x1"x1/4" PLEXIGLAS WITH 1/4" CENTRAL HOLE FILED SQUARE
SIGNAL LEAD INSULATED FROM NEEDLE, ⌀20 FORMVAR INSULATED COPPER
CENTRAL CONDUIT
TROUGH FOR ⌀20 BRAIDED SHIELD LEAD

Fig. 2 — Diagram of the modified coaxial electrode illustrating constructional details and dimensions.

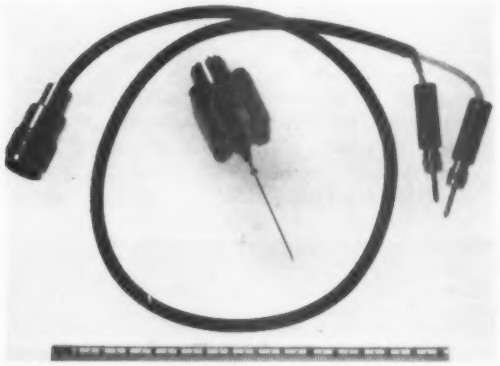

Fig. 3 — View of the modified coaxial electrode and the coaxial cable and fitting for connection to the amplifier first stage.

determinations on the same or different patients with the assurance that probe parameters will remain constant.

2. Complete coaxial shielding throughout. This allows the use of high gain amplifiers in an unshielded area.

3. Durability and handling ease. The original model made two years ago is still in use.

4. Cold sterilization is easily accomplished and efficient. No infections have occurred in more than 300 determinations.

5. Ease of manufacture. Construction is simple and easily accomplished by the average investigator.

In the manufacture of this probe, we have routinely used liquid Plexiglas® to cement the central conductor in place. In regrinding the bevel a fine oil stone is used and care must be exercised to prevent shorting between the needle barrel and central conductor at the tip. Formvar® insulated platinum wire of 26-gauge may be used for the central conductor.

A short length (less than two feet) of RG 62/U coaxial cable with a PL 256 coaxial fitting is used to connect the probe to the cathode follower input of the amplifier. The probe may be supported at any level or angle within the

muscle with a few blocks of ½″ thick sponge rubber. The needle barrel acts as the primary ground connection to the patient and further grounding is undesirable. The probe is remarkably well tolerated and pain is noted only when a sensory nerve is impinged upon.

The area of signal pick-up of this electrode has been found to be less than 5 mm. and precise determinations can be made from various muscle groups in close proximity without "cross talk." The frequency response is flat from 10 cycles per second to 2 megacycles per second. Actually the electrode provides adequate passband characteristics up to 8 megacycles, which should allow unaltered reproduction and amplification of pulses with fast rise times. Muscle action potentials with rise time in the order of 0.1 millisecond have been observed using this electrode and the electrode is capable of unaltered wave forms of much higher rise times. The inherent capacity of the electrode was calculated to be 4.6 micro micro farads and RG 62/U coaxial cable was selected for connection to the cathode follower because of its low capacitance per foot, small size, light weight and flexibility.

A modification of the coaxial needle electrode for electromyography has been presented. The design produces an exceptionally convenient and durable electrode and eliminates the variables produced by the frequent replacement of the standard type.

N.B. Since this paper was written we have applied the same principles to the construction of an electrode using subminiature components. (Amphenol type 27-1 plugs, type 27-3 receptacles, and type 21-598 coaxial cable). This results in a great increase in ease of handling due to a 10 fold reduction in weight and increased cable flexibility. The electrical characteristics are identical with those of the electrode described.

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Information relative to securing reprints of this study may be had by checking the Reader Service column on page iv of this issue.

Money is like an arm or a leg —
Use it or lose it.
— HENRY FORD

Active Immobilization for Arthritic Wrists and Knees

Michael Kelly, M.D.
Australia

● Rheumatoid arthritis is characterized by acute attacks in individual joints. Most of the disability comes from acute attacks on knees and wrists, which are held flexed until they cannot be straightened. Disabilities of fingers are usually secondary to arthritis of the wrist; the most common cause of inability to walk is a flexion deformity of the knees. Flexion deformities can be prevented by immobilization of acutely inflamed knees and wrists in extension; the hand should be used and the leg should be walked on. Flexion deformities of knees and wrists should be corrected under general anesthesia; immobilization should then be performed. If the joint has any cartilage, flexion returns after these procedures. If there is no cartilage, the patient is grateful for a painless ankylosis in good position.

I believe that "active immobilization" plays an essential part in the rehabilitation of the arthritic patient. Its intelligent use frequently eliminates the necessity for rehabilitation. Splinting is necessary for painful joints because the patient cannot use a painful limb. But the fixation must be active; the patient must use the limb within painless range. Active immobilization has been made possible by the use of light plaster of Paris applied next to the skin. It is useful because rheumatoid arthritis is a disease of movement; and the inflammation of the joint settles down as soon as it is immobilized. The expression is borrowed from the late Sterling Bunnell, who wrote of active splinting.

Sir Robert Jones used to emphasize the principle that active movement with fixation of the painful joint made for good nutrition and rapid repair. I have made it my purpose to discover what could be done for arthritic patients by this method. It was a nearly virgin field; nobody was employing it, though nearly all paid lip service to the principle of mechanical support for arthritic joints. At first I experimented by immobilizing painful joints indiscriminately, and sometimes I got encouraging results. Thus I frequently splinted the wrist and metacarpal and digital joints at the same time (fig. 1A and 1B). Gradually it came home to me that in the upper limb the wrist was the key; when the wrist was fixed, the shoulder and the other joints of the hand often improved unaccountably. In the lower limb the knee is the key.

Fig. 1 — (A, upper) Left, cylindrical cast allows patient to walk on arthritic left knee. Wrists too are in casts; one is covered with a woolen mitten. (B, lower) Right, patient can flex left knee after three weeks in plaster.

Gradually I became convinced of the evils of bedrest. As I look back on the past 12 years I can see clearly who are the patients who have done badly and who are the ones who have done well. Those who have done well are the ones who had a job to do; those who became cripples are the ones who took to bed and were looked after by a kindly daughter or niece. A common belief is that the patient with rheumatoid arthritis must begin treatment with several weeks in

Read at the Pan-Pacific Rehabilitation Conference, Sydney, Australia, November 14, 1958.

Director, Institute of Rheumatology, East Melbourne.

bed. A booklet used by the Empire Rheumatism Council says so. I disagree; rest in bed for the majority of patients would be the commencement of crippling.

Deformity: Arthritis as a Cause

Arthritic deformity is a great deal more common than deformity from spastic paralysis or from poliomyelitis. But prevention in these disorders has been grounded on certain accepted principles. In both spastic paralysis and poliomyelitis, the deformity is due to loss of balance of muscles. In fact, nearly all deformities, including those of arthritis, are due to loss of balance of muscles. This assertion may seem to be an exaggeration; thus you have seen arthritic patients whose knees became deformed through softening of the bone, and others with ulnar deviation due to gravity.

Other causes of deformity cannot be ignored; there is always a combination of four factors; (1) muscle balance, (2) external forces, (3) shortening of ligaments, and (4) softening of cartilage and bone. Disturbed muscle balance is first in time and in importance. External forces (pressure of the shoe on foot; weight of limb or of body) are less important. Many weeks afterward comes fibrotic shortening of muscles, ligaments, and capsule. To become permanently shortened, the inflamed tissues must have been held in an incorrect position for a long time, and the opposing muscles and ligaments become lengthened.

Still later is destruction of the cartilage and bone, which makes the deformity permanent. All the tissues of the joint must be inflamed; bone has to be softened like cheese. It may lose its rounded shape and flatten against the bone which is pressing against it. This takes years of sitting in a vicious posture.

In arthritis there are six different ways in which muscle balance may be disturbed.

1. *Voluntary Maintenance of Incorrect Posture.* Wrists are allowed to droop, or a pillow is put under the knees in bed persistently, or the patient sits for a long time in a low armchair with the knees bent.

2. *Reflex Spasm.* All the muscles of the painful joint reflexly tighten, especially when the joint is moved. They are on guard all the time. The powerful flexors usually overcome the weaker extensors, which become lengthened.

3. *Wasting of Muscles Often with Inability to Resist Gravity.* It follows directly on the first and second factors and makes their effects permanent. The first two factors are reversible; the incorrect posture can be corrected and the muscular spasm may be transient. But wasting of a muscle is more permanent, and therefore the most important of all causes.

4 and 5. *Rupture and Adhesion of Tendons.* These are not so common as the other causes.

6. *Deformity of Neighboring Joint.* A patient with a flexion deformity of the knees has, as a direct result, hyperextension of the ankles and flexion of the hips.

The most common external force which acts on a joint is gravity — the weight of the limb or the weight of the body. The weight of the body on the knees is difficult to resist if the quadriceps are weak; it often leads to a flexion deformity. It acts in association with other factors. If the weight of the hand on the wrist is not resisted, wrist-drop will follow with all its undesirable sequelae.

Muscle Wasting

Wasting is due to reflex inhibition of muscle, propagated through nervous impulses from the painful and swollen joint. In this, arthritis resembles poliomyelitis, but it differs in three ways: (1) the wasted muscles are never paralyzed, (2) arthritis is not self-limited — it may flare up and give rise to renewed wasting, and (3) in arthritis the wasting may be accompanied by pain which renders muscular contractions difficult.

In arthritis of the knee, the flexors have all the advantages: they are stronger than the extensors; they are helped by gravity, and flexion is the position of greatest comfort. We should concentrate on the extensors and forget the flexors. Faradism is valuable to keep the muscle working when no voluntary contractions are possible. Far better for

muscle which can contract voluntarily is will power poured down the nerve. If a muscle has a nerve supply and is able to give a voluntary flicker, be thankful and concentrate on this. Heat, short wave, and massage are of no use; they are actually harmful if they give the patient the wrong impression and make him too complacent.

Arthritis is painful and the patient does not like extending the knee. If told simply to exercise, the patient may do what Jones called pump-handle movements; the effect of repeated movement of an inflamed joint is to intensify the inflammation. The total effect of the efforts is only to increase the stiffness and wasting.

Polyarthritis is a chronic disease, but its crippling effects come from acute attacks in individual joints. As it spreads it often uses the joint last involved as a "springboard." If in any joint the acute attack can be prevented from becoming chronic, a possible source of spread is eliminated. In the wrists and the knees, acute attacks are most painful, and in the same two joints the most crippling chronic effects are seen.

Sitting with Bent Knees

A patient with painful knees is often tempted to sit in a low armchair. This is hard to get out of and all attempts to get out cause pain, so he stays there. The flexed position becomes habitual, and when the patient goes to bed he cannot straighten his knees for long. Then a friend advises him to put them over a pillow to make them more comfortable; and this too becomes a necessity.

Sitting with knees bent produces stretched and wasted extensors and contracted flexors which will be hard to coax to full length again. A patient with a flexion deformity of the knees has literally to walk on the quadriceps muscles, which are stretched like weak bits of elastic. The patient may have a low bed on which he has to flex his knees and hips acutely while sitting on the edge before getting up. The strain on the quadriceps is great and he levers himself out of bed; he cannot give himself much assistance if his wrists are painful.

One of the worst cases of flexion deformity which I have seen was in a tall girl whose father bought her a small car in which to visit her friends. The driver's seat of a small car has every possible fault; it is low and cramped and the occupant cannot straighten the knees.

We can stand with our knees straight because they lock in extension and we do not use our muscles; prolonged standing is not fatiguing. In my parish church in Melbourne there is a seat which all parishioners avoid. To the casual eye it looks like the others, but only visitors to the parish ever occupy the seat. The reason is that the seat is 3 inches too far forwards; when you stand it pushes you behind the knees and bends them a little. To stand with slightly bent knees, for only a few minutes, is sufficiently uncomfortable to make healthy people remember it next time they go to the church. How difficult therefore must standing be for a patient with painful swollen knees and weak quadriceps which will not extend them!

A habitually vicious posture damages not only muscle; it further damages the knee joint by keeping it inflamed. The weight is distributed unevenly on the articular surfaces. The medial condyles of femur and tibia, which are stronger than the lateral condyles, do not take their share of weight bearing. The lateral condyles may soften, and the lower leg may become abducted and twisted outward. This is the well-known torsion deformity.

All the tissues of the body need normal use in order to preserve their health. Articular cartilage needs to be rubbed against articular cartilage; the bones of the femur and tibia need the stimulus of weight bearing. These requirements will be fulfilled if the knee is kept straight and if the patient walks.

Prevention is the best treatment; the patient should be warned about the bad habits that might develop. The knee should not be flexed unnecessarily; the patient should concentrate on keeping it straight most of the time. Many a patient has found useful a card with precise

instructions on how to look after the knees:

1. Do stiffening exercises twelve times every hour to strengthen thigh muscles.
2. Do not sit with knees bent. Straighten them every few minutes when sitting or lying down.
3. Avoid low armchairs. Have a stool 24" high or raise armchair on blocks.
4. Never put a pillow under the knees in bed.
5. Do not walk in slippers or in bare feet.
6. On stairs, one step at a time. Going up, the good leg first; going down, the bad leg first.
7. Have crutches on hand for use in emergency.

Treatment of the Knee with Active Immobilization

Nearly every arthritic knee needs continuous support for its extensors if muscle balance is to be restored. But there is a disadvantage; immobilization of a joint causes further atrophy through disuse. Incessant quadriceps drill is absolutely necessary.

Every painful knee should be immobilized in full extension, either with a cylindrical plaster, which reaches 9 inches above and below the knee (fig. 1A), or better still with a caliper which is fixed on and worn continuously day and night. It is a band caliper, that is, it has a band around the top of the thigh instead of a ring, and the limb bears the weight. The muscles are used for their natural purpose and the articular cartilages get their natural stimulus. Quadriceps drill is incessant. The relief of pain is quite dramatic; the patient with a fixed knee can immediately walk without pain.

If the attack is recent, the splinting may be discarded in a few days; if more than a few weeks, the knee may be immobilized for three weeks without any harm. Then the caliper may be taken off at night and worn during the day. Then it is left off for an hour or two every day; then for gradually increasing periods. Ankylosis does not occur; flexion returns in the normal course of events (fig. 1B). No active attempts should be made to bend the knee; this would flare it up again and undo whatever good had been done. If two knees are painful, two calipers or cylindrical splints may be worn and the patient uses crutches.

Inflammation and swelling invariably subside forthwith; the patient is usually surprised after a day to find that the knee is quite loose in a plaster which had fitted closely.

Correction by Manipulation

Many flexion deformities can be corrected with ease under general anesthesia. The correction should be performed with one firm movement, and the knee should be splinted. There is never a severe reaction so long as the knee is fixed firmly; an "umbrella" of cortisone is not necessary. Acute swelling of a flexed knee is not a contraindication to the correction of the deformity. The patient should walk next day.

If the deformity is recent, and if the joint cartilage is intact, a good range of flexion will return when the splint is dispensed with. If the cartilage has disappeared, the operation is performed to get a stable ankylosis in extension, and the patient is extremely grateful.

Too much force will break the fragile bones or tear nerves and vessels. Old and severe deformities can seldom be corrected; sometimes it can be done in two stages. The posterior ligaments yield at the first attempt, but the resistance of the flexor muscles is too great. A plaster is applied with the deformity half corrected; a few days later, under second anesthesia, the flexor muscles usually yield without any trouble.

Diagnosis of Arthritis of the Wrist

The most common cause of inability to use the hand is arthritis of the wrist. It is also the most common cause of swelling of the hand, and of pain in the fingers. Without a careful history and examination, errors of diagnosis can be made. If every joint is examined carefully, a tender spot may be found on the volar aspect of the wrist.

Usually an arthritic wrist has lost 45 degrees of extension; in trying to avoid pain the patient has held the forearm pronated and the wrist flexed until he could not extend it. He may be able to prevent wrist-drop during the day, but cannot prevent it at night, when the pain is worse.

Fig. 2 — Plaster cast on wrist allows free use of fingers and forearm.

Painful swelling of the wrist can usually be abolished by the application of a plaster cast with the wrist fully extended (fig. 2). The position should be halfway between pronation and supination, in order that rotary movements may be permitted. The thumb and fingers should be left free and the hand should be used as much as possible. Relief of pain is dramatic, more especially if two painful wrists have been treated. The swelling of the fingers subsides, and in a few days the patient can use the hand. The wrist is immobilized for three weeks, then a removable plaster splint is worn at night and for part of the day. Better for part-time wear is a leather support, well cocked up and strengthened with metal (fig. 3).

Fig. 3 — Leather supports allow use of both wrists.

The dropped wrist may be corrected under anesthesia and plaster applied. The improvement in the function of the hand is often amazing. Other joints (shoulder, elbow) also frequently improve, and often the whole polyarthritic process goes into reverse.

Most cases of "carpal canal syndrome" are in fact arthritis of the wrist. The flexor sheaths are involved in the rheumatic inflammation of the articular and periarticular structures, and the sheath of the median nerve is affected. Signs of median involvement of every degree have been relieved forthwith by immobilization of the wrist. In old-standing cases the chief disability may appear to come from stiff and atrophied fingers, but the wrist has usually been at fault in the first place.

The Nonperfectionist Approach

I have learned from these patients that we should not be perfectionists in our approach to arthritis. If there is no hope of getting a mobile and weight-bearing knee, we tend to get pessimistic. Many of us look on a stiff joint as something to be ashamed of. But the patient usually asks us for two things only: (1) that we rid him of pain; (2) that we allow him to walk (or to use his hand). Both these effects can often be obtained by a nonperfectionist approach. Where joints are concerned, we should be prepared to cut our losses.

Ankylosis is not an inevitable effect of rheumatoid arthritis. Ankylosis develops only after a painful deformity has been present for a long time. Application of plaster at the right time, with or without correction of the deformity, prevents ankylosis.

Should Immobilization Be Continuous or Intermittent?

Great respect is paid everywhere to the principle of rest for arthritic joints. Rest is good, but the technical difficulties of applying it are too great. Or we may apply a splint to a painful joint, with instructions to the patient to remove the splint and move the joint once or twice a day. But there is a great difference between continuous and intermittent splinting for acutely inflamed joints. Intermittent immobilization is extremely valuable for arthritic joints which are not acutely inflamed, or in which weakened muscles need support. It gives considerable help to acutely inflamed joints, but continuous splinting gives still more help.

Everyone practices intermittent splinting, but I believe that for painful knees

and wrists they should begin with three weeks of continuous splinting. When the patient asks us to treat the painful joint, we should apply the most effective measures. When a splint has been applied, a daily movement undoes much of the good which splinting has done. If the joint needs rest, it needs every possible bit of rest it can get, until the object of treatment, abatement of pain and swelling, has been achieved.

For damaged joints with wasted muscles, intermittent splinting is of extreme value as a long-term measure to prevent deformity. It is necessary also when the continuous splinting of knees and wrists has come to an end.

Summary

Rheumatoid arthritis is characterized by acute attacks in individual joints. Most of the disability comes from acute attacks on knees and wrists, which are held flexed until they cannot be straightened.

Disabilities of fingers are usually secondary to arthritis of the wrist; the most common cause of inability to walk is a flexion deformity of the knees.

Flexion deformities can be prevented by immobilization of acutely inflamed knees and wrists in extension; the hand should be used and the leg should be walked on. Flexion deformities of knees and wrists should be corrected under general anesthesia; immobilization then should be performed as described.

If the joint has any cartilage, flexion returns after these procedures. If there is no cartilage, the patient is grateful for a painless ankylosis in good position.

Information relative to securing reprints of this study may be had by checking the Reader Service column on page iv of this issue.

There are two ways of being happy: We must either diminish our wants or augment our means — either may do — the result is the same and it is for each man to decide for himself and to do that which happens to be easier.

— BENJAMIN FRANKLIN

"Pulse of a Nation" . . . . .

portrait of washington, d. c. iv

Mount Vernon

Mount Vernon — a venerated shrine of American history

Mount Vernon, the home and last resting place of George Washington, stands in majestic dignity above the Potomac River. No other shrine of American history has more universal appeal than Mount Vernon with its authentic colonial charm. Each piece of furniture is either an original from the Washington residence or a reproduction complete to the last detail. Through the efforts of Mount Vernon Ladies Association, Mount Vernon was restored and is now maintained.

The original Mount Vernon estate, including 5,000 acres along the Potomac River, was patented in 1674 to Nicholas Spencer and John Washington, first of the name in America and the great-grandfather of George Washington. The families divided the property in 1690. Augustine Washington, the father of George Washington, built a home there in 1735. Eventually the land and the home itself came into the possession of George Washington. In 1759, he married Martha Dandridge Custis, a young widow. Mount Vernon was renovated over a period of years and almost up to the date of Washington's death in 1799. The numerous outbuildings where the work of estate was carried on constituted a self-sustaining village. It took 66 servants to operate the home estate and 150 more to keep the four outlying farms going. Most of the latter were field hands.

At the end of the walk leading from the house group stands the ivy-covered tomb of the Washingtons, with an open outer vault containing the two simple marble sarcophagi. In 1855, the last family burial was made in the tomb. At that time, the doors were then locked and the key was thrown into the Potomac River.

Mount Vernon today is held in such veneration that every ship of the United States Navy, while passing the spot, lowers its flag half-mast. During the Civil War, this ground was held neutral by both sides.

Marine Corps War Memorial

"Uncommon valor was a common virtue" . . . Marine Corps War Memorial

Depicting the famous scene of the flag-raising at the top of rocky Mount Suribachi on Iwo Jima during World War II is the Marine Corps War Memorial. The colors are raised on the memorial each morning by special detachment of Marines in full dress uniform. The colors are lowered each evening. The statue is floodlighted at night.

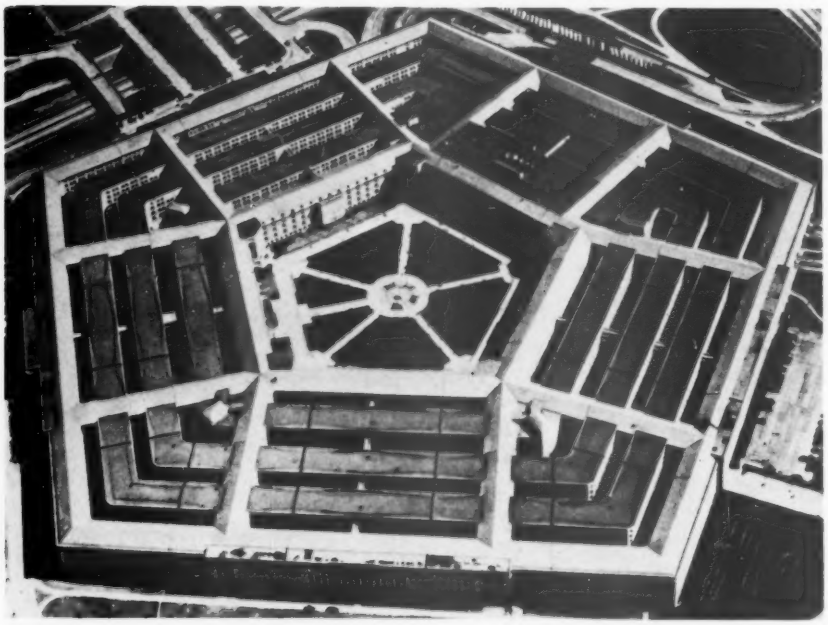
This massive monument has become one of the most visited and most photographed shrines in the Washington area. It was dedicated November 10, 1954 on the 179th anniversary of the United States Marine Corps. It is a national monument to this arm of the service, and to the Marines who have given their lives in battle since the Corps was founded in 1775.

This statue is a recreation of the stirring event recorded by a photographer and which became the outstanding symbol of the American effort in World War II. The tribute of Admiral Nimitz, "Uncommon valor was a common virtue," takes on real meaning as one views the statue and reads the words inscribed on the granite base. Also inscribed on another portion of the base of the statue is the inscription: "In honor and in memory of the men of the United States Marine Corps who have given their lives to their country since November 10, 1775."

This monument is the largest cast bronze statue in the world and the largest monument ever attempted by a contemporary sculptor. The six figures of Marines planting the flag are 32 feet high; the bronze flagpole they are erecting is 60 feet high. The M-1 rifle carried by one of the figures is 16 feet long; the carbines are about 12 feet long; and the canteen clipped to the belt of another figure, if filled with water, would hold 32 quarts!

The Iwo Jima flag-raisers stand on rough Swedish granite which approximates in appearance the top of Mount Suribachi. This rock slope is faced on the sides with polished Swedish black granite. Burnished into these blocks, in gold lettering, are the names and dates of every Marine Corps engagement.

The Pentagon



The Pentagon Building

Headquarters for the United States Department of Defense is the Pentagon, located on the Virginia side of the Potomac River. In this tremendous building are the offices of the Secretary of Defense, the Secretary of the Army, the Secretary of the Navy, and the Secretary of the Air Force, all with Cabinet or sub-Cabinet status. There are also the offices of the joint chiefs of staff, the commandant of the Marine Corps, and the staffs and chiefs of staffs for all the military services.

Housing more than 30,000 employees, the pentagonal structure is the largest office building in the world. It is twice as large as the Merchandise Mart in Chicago, and has three times the floor space of the Empire State Building in New York. Each floor of the building is formed by five concentric rings connected by ten spokelike corridors. This tremendous military nerve center for the United States and its allies in the free world is beyond comparison in many respects. Although it is strictly a utilitarian structure, it has approximately 30 miles of access highways, 200 acres of lawn, parking space for 9,000 automobiles, 150 stairways, 19 escalators, 3,000 clocks, 550 water fountains, and various other installations. From this building 135,000 telephone calls are made daily, and 155,000 pieces of mail are cleared through the building post office itself.

The building was erected during World War II and it is regarded as one of the most efficient office structures in the world. Although there are 17½ miles of corridors, it takes only six minutes to walk between any two extremes of the building. Construction of the building required 16 months and cost nearly 85 million dollars. After working hours, the building is closed to all visitors and security precautions are stringently enforced.

Special Events

The National Cherry Blossom Festival is enhanced by the crown bearer (flanked by guards) who proudly displays the valuable pearl crown worn by the festival queen. This crown is a treasured gift from the people of Japan to the people of the United States.

After the coronation . . . the queen and part of her court

Washington's welcome mat, rolled out to invite the visitor every day of the year, is extra-tempting during the periods of special events in this most beautiful city. Spring is welcomed with one of the finest celebrations anywhere, the renowned National Cherry Blossom Festival, usually held early in April. Summer is marked by Washington's Summer Jubilee, June 15 through Labor Day. Fall offers the events of the President's Cup Regatta, including its famed "World Series" of unlimited hydroplane racing. And the dignity of the winter season is marked by the Christmas Pageant of Peace which includes the lighting of the National Community Christmas Tree by the President of the United States. Flower shows, automobile shows, home shows, garden tours, Embassy tours, tours of the City's many shrines, monuments and public buildings afford other entertainment during the year. Notable events, such as the annual opening of the sessions of the Congress, and the every-fourth-year inauguration of the President with its attendant Inaugural Parade on historic Pennsylvania Avenue, are typical of the Nation's First City.

Places of Interest

WEST OF THE MALL

PAN AMERICAN UNION — ORGANIZATION OF AMERICAN STATES, 17th Street, Constitution Avenue to C Street, N.W., is maintained by the 21 American republics. The building, one of the most beautiful in the world, contains a fine collection of statuary. In the entrance hall is an exquisite Latin patio and fountain and a sliding roof of glass which can be opened in warm weather. In the Hall of Heroes are busts of the great liberators and founders of the Latin American republics. In the rear is a unique Aztec garden. Open Monday through Friday, 9 a.m. to 4 p.m.; Saturday, 9 a.m. to 1 p.m.; Sunday, 1 p.m. to 5 p.m.

MEMORIAL CONTINENTAL HALL, 17th Street, C to D Streets, N.W., is the national headquarters of the Daughters of the American Revolution. A genealogical library and 28 period state rooms are open to the public. Tours Monday through Friday, except holidays, from 10 a.m. to 3 p.m. No admission. Historic items are displayed in the museum.

CONSTITUTION HALL, 18th Street between C and D Streets, N.W., is also the property of the D.A.R. Seating 4,000, this fine auditorium is the home of the National Symphony Orchestra and is used for concerts and other events.

THE OCTAGON, 18th and New York Avenue, N.W., built by Col. John Tayloe from 1798-1800, was the executive mansion used by President Madison from 1814-15 after the White House had been burned by the British during the War of 1812. The building curiously is misnamed inasmuch as it has only six sides. It is now headquarters of The American Institute of Architects and contains changing exhibits of architecture, sculpture and allied arts. Open Tuesday through Saturday, 9 a.m. to 5 p.m.; Sunday, 2 p.m. to 5 p.m. No admission.

AMERICAN RED CROSS BUILDING, 17th Street, D to E Streets, N.W., dedicated to the women of the War Between the States, is headquarters of the American National Red Cross. The building has several exhibits of interest on the first three floors. Adjoining it is a memorial building, dedicated to the heroic women of the First World War, which is open Monday through Friday, 9 a.m. to 4 p.m.

CORCORAN GALLERY OF ART, 17th Street, from E to New York Avenue, N.W., has an extensive collection of American paintings, drawings, prints and sculpture from the 18th to the 20th century; frequent exhibitions of modern arts; and the W. A. Clark collection of European paintings and sculpture, rugs, tapestries and pottery. Open Tuesday through Friday, 10 a.m. to 4:30 p.m., Saturday, 9 a.m. to 4:30 p.m.; Sunday and holidays, 2 p.m. to 5 p.m. No admission.

DEPARTMENT OF THE INTERIOR covers two city blocks, from C to E Streets, and 18th to 19th Streets, N.W. The Department Museum is open Monday through Friday, 7:45 a.m. to 4:15 p.m. Exhibits cover phases of natural resource discovery, development use and conservation. Native arts and crafts of the American Indian, as well as those of Alaska, Hawaii and the Virgin Islands, are on display. Contact curator for tours.

THE AMERICAN INSTITUTE OF PHARMACY, 2215 Constitution Avenue, N.W., is headquarters of the American Pharmaceutical Association. Here are laboratories for developing drug specifications, editorial and administrative offices, a technical reference library and pharmaceutical museum. The museum and library are open to visitors Monday through Friday, 10 a.m. to 4 p.m.

LINCOLN MEMORIAL is directly on a line with the Capitol and the Washington Monument. Between the Memorial and the Monument lie two reflecting pools with a combined length of 2,292 feet. The stately marble building, designed by Henry Bacon, stands just before the Washington approach to Arlington Memorial Bridge. The 36 columns, one for each state in existence in Lincoln's time, symbolize the Union. Dominating the interior is the colossal statue of Lincoln by Daniel Chester French, and on the walls are carved the Gettysburg Address and the Second Inaugural Address. Murals, by Jules Guerin, suggest allegorically the themes of Emancipation and Reunion. Open daily, 9 a.m. to 9 p.m. No admission.

GEORGETOWN

DUMBARTON HOUSE, 2715 Q Street, N.W., is the headquarters of the National Society of the Colonial Dames of America. The house, built around 1800, contains many rare colonial pieces. Open Monday through Saturday, 10 a.m. to 5 p.m.; closed on Sunday and holidays. No admission.

DUMBARTON OAKS PARK occupies 27 acres of the former 50-acre estate of Robert Woods Bliss. Entrance off Massachusetts Avenue below Whitehaven Street, or Lover's Lane off R Street between 30th and 31st. This wooded area, with streams and waterfalls, is most attractive from early April to late June. Open to pedestrians only, April through October, Saturday, Sunday and holidays; 9 a.m. to 5 p.m. No admission.

DUMBARTON OAKS RESEARCH LIBRARY AND COLLECTION, 1703 32nd Street, N.W., contains some 50,000 volumes and an art collection of the early Christian and Byzantine periods. It was donated by Mr. and Mrs. Robert Woods Bliss to Harvard University in 1940 as a research center and incorporated in the District of Columbia under Trustees for Harvard University in 1941. Surrounding the house are formal gardens. It is closed July through Labor Day.

THEODORE ROOSEVELT ISLAND, a memorial to the twenty-sixth president, lies in the Potomac River in the area between Key and Memorial Bridges. Park naturalist is on duty weekends. A ferry leaves the foot of Wisconsin Avenue for the 90-acre island from 1 p.m. to 4:30 p.m. on weekends during the summer; fare 25c, children 15c.

OTHER PLACES IN NORTHWEST SECTION

HOUSE OF THE TEMPLE, Supreme Council, 33°, (Scottish Rite Temple), 1733 16th Street, N.W., was modeled after the Tomb of Mausolus at Halicarnassus in Asia Minor. The building itself is of interest, and contains collections of both general and Masonic interest. Open Monday through Friday 8:30 a.m. to 5 p.m.; Saturday until noon; closed Sunday and holidays. Guided tours are available.

WASHINGTON CHAPEL (Mormon), 16th Street and Columbia Road, N.W., is of Bird's Eye marble, imported from Utah. Guided tours are available by advance request only.

THE PHILLIPS GALLERY, 1600 21st Street, N.W., at Q Street, has a distinguished collection of nineteenth and twentieth-century American and European paintings. Frequent concerts are scheduled. Open daily; no admission.

ANDERSON HOUSE, 2118 Massachusetts Avenue, contains the headquarters and museum of The Society of the Cincinnati, founded by Gen. George Washington and a group of American Army officers in 1783. Membership is composed of one male descendant of each officer in the Continental Army or Navy during the Revolutionary War. Open Monday through Saturday 2 p.m. to 4 p.m.; closed Sunday and holidays. There is no admission charge to enter the house.

ISLAMIC CENTER (Moslem Mosque), 2551 Massachusetts Avenue, N.W., when completed will be an institution of Moslem worship, education and culture. The minaret, about 160 feet high, and the mosaic inscriptions in Arabic of verses from the Holy Koran are noteworthy. Call for information on visiting hours. Admission to the center is free.

NAVAL OBSERVATORY, 34th Street and Massachusetts Avenue, N.W., occupying a 72-acre plot encompassing a complete circle, determines correct standard time; publishes official almanacs for astronomers and navigators; determines positions and investigates motions of celestial bodies. It maintains one of the finest astronomical and mathematical libraries in the world. Open Monday through Friday except holidays; conducted tour at 2 p.m. daily. Night tours are conducted once a month during the full moon on Tuesday, Wednesday and Thursday at 8 p.m. and 9 p.m., EST. A pass and further information about this tour may be obtained by writing, or call DEcatur 2-2723, extension 17. Children under 12 are not admitted.

WASHINGTON CATHEDRAL (CATHEDRAL CHURCH OF ST. PETER AND ST. PAUL), on the crest of Mount St. Alban at Massachusetts Avenue and Woodley Road, N.W., is a fine example of Gothic architecture. Owned and administered by the protestant Episcopal Cathedral Foundation, the Cathedral when completed will rank among the largest in the world. Its stained glass windows, created by American craftsmen, are very fine. Here are the tombs of Woodrow Wilson; Admiral Dewey; the Right Rev. Thomas J. Claggett, first Episcopal Bishop to be consecrated on American soil; and others of prominence. The Cathedral is open daily. Visitors are welcome on the Cathedral grounds where the Bishop's Garden, the Herb Garden and Herb Cottage Greenhouse, the Cottage Herb Shop, the Pilgrim Steps and the Wayside Cross are among the favorite sights.

ROCK CREEK PARK follows the valley of Rock Creek through northwest Washington. It comprises nearly 1,800 acres of natural woodland, with 15 miles of drives, about 27 miles of bridle paths and many footpaths. Old Fort De Russey, one of the Washington defenses in the War Between the States, stands near the fork of Oregon Avenue and Military Road, and can be reached on foot or horseback. Near the fort on Beach Drive is the log home of Joaquin Miller, author of "Songs of the Sierras."

Old Pierce Mill, built about 1820 and operated until 1897, is north of Park Road. It is now in operation as an example of the "undershot" type of water-power mill. Visitors may watch the milling process.

ROCK CREEK NATURE CENTER is one block east of Connecticut Avenue and is just north of the National Zoological Park. Open Saturday 9:30 a.m. to 4:30 p.m.; Sunday 1 p.m. to 4:30 p.m.

NATIONAL ZOOLOGICAL PARK adjoins Rock Creek Park with entrances on Connecticut Avenue and Adams Mill Road. The 175-acre tract affords a natural background for the fine collections of mammals, reptiles and birds. There are four modern exhibition buildings and others less modern, and many outdoor enclosures in which are housed nearly 3,000 animals representing almost 800 different kinds. The grounds are open from daylight to dark.

THE ARMED FORCES INSTITUTE OF PATHOLOGY, 6825 16th Street, N.W., on the grounds of Walter Reed Army Medical Center, is the central laboratory of pathology for the Department of Defense and other Government agencies agreed upon by the Department and the agency concerned. Oldest component of the four major departments of the AFIP, the *Medical Museum*, 9th and Independence Avenue, was founded in 1862. Exhibits include diseases and injuries of war inflicted by weapons ranging from arrowheads and stone axes to atomic explosions, human and animal pathology and anatomical and embryological material. The museum houses one of the world's largest collections of old microscopes, as well as collections of other medical instruments. Motion pictures on medical topics are shown on Sunday. Guided tours and lectures on the history of medicine are offered. Open daily 9 a.m. to 5 p.m. No admission.

NATIONAL BUREAU OF STANDARDS, Connecticut Avenue and Van Ness Street, N.W., is the principal government agency for basic research in physics, mathematics, chemistry and engineering. Guided tours of the bureau must be arranged in advance.

ROCK CREEK CEMETERY, Rock Creek Church Road and Webster Street, N.W., was established in 1719. This is the oldest cemetery in the District, and contains St. Paul's Church, the oldest church in the District. Most noted of the memorials is the figure commonly known as "Grief," by Augustus Saint-Gaudens. Other notable memorials include the Ffoulke memorial, "Rabboni," by Gutzon Borglum, and the Boardman memorial, "Journey of Life," by James Earle Fraser. The cemetery is open from 8 a.m. to dusk.

NORTHEAST SECTION

NATIONAL SHRINE OF THE IMMACULATE CONCEPTION, on Catholic University campus, Michigan Avenue at 4th Street, N.E., Brookland, D. C., will be the largest Catholic building in the Western Hemisphere and one of the great basilicas of the world when completed. The northern and southern crypts, two large sacristies and the basement are finished after more than 20 years of work. The shrine is designed after Romanesque and Byzantine ecclesiastical architecture. Among many works of art is a mosaic reproduction of Murillo's "Immaculate Conception" and Ivan Mestrovic's "Queen of the Universe." The walls and columns of the Memorial Chapel are covered with memorial tablets. In the west transept is a miniature Grotto of Lourdes. Open 7 a.m. to 8 p.m.; services daily.

FRANCISCAN MONASTERY, 14th and Quincy Streets, N.E., on Mount St. Sepulchre, is about one-half mile from Catholic University. It is the "Memorial Church of the Holy Land," where the holy places of the old world have been reproduced; these include the Bethlehem Grotto, the Holy Sepulchre, the Catacombs, the Garden of Gethsemane, the Way of the Cross, the Tomb of the Blessed Virgin and the Grotto of Lourdes. Open daily 6 a.m. to 9 p.m.; guide service available 8 a.m. to 5 p.m.

ANACOSTIA PARK lies on both sides of the Anacostia River, in the northeast and southeast sections of the city. In 1608, a year after Jamestown was founded, Capt. John Smith made his way up the Potomac River where he found the large Indian village of Nacotchtank in what is now Anacostia Park. The park covers 750 acres, and contains a bird sanctuary, Kenilworth Aquatic Gardens, 2 public golf courses, tennis courts, a swimming pool and baseball and football fields.

U. S. NATIONAL ARBORETUM, M Street and Maryland Avenue, N.E., was established to conduct research with woody plants and to study all types of trees that can be grown in the area. A network of roads and foot trails enables visitors to observe thousands of plants arranged in varied patterns. The arboretum contains one of the most extensive azalea plantings in the nation. Open by appointment.

SOUTHWEST SECTION

FORT LESLEY J. McNAIR is at 4th and P Streets, S.W. This scenic Army post, founded in 1784, houses the National War Colleges and the Industrial College of the Armed Forces.

BOLLING AIR FORCE BASE, on the south side of the Anacostia River, at its junction with the Potomac, is the headquarters base of the U. S. Air Force's globally diffused Headquarters Command. It is one of the oldest air bases in the country. The main entrance is at South Capitol and Portland Streets. The U. S. Naval Air Station is adjacent. Visitors are welcome.

FORT WASHINGTON, 12 miles from the city on a 341-acre reservation on the Maryland side of the Potomac, occupies the site of the earliest fortification erected for the defense of the National Capital. Museum is open daily May through September. The fort and picnic areas are open all year.

NEARBY VIRGINIA

ARLINGTON NATIONAL CEMETERY is reached by the Arlington Memorial Bridge from the Lincoln Memorial.

MARINE CORPS WAR MEMORIAL, on a promontory overlooking the Nation's Capital, is a 78-foot, 100-ton reproduction of Joseph Rosenthal's Iwo Jima flag raising photo. The huge figures were cast in bronze from a model by Felix de Weldon.

MOUNT VERNON is 16 miles south of Washington via the Mount Vernon Memorial Highway.

FORT MYER is headquarters for the 3rd "Old Guard" Infantry Regiment.

PENTAGON BUILDING, reached by Arlington Memorial or Highway Bridge, is the world's largest office building. Covering a total ground area of 34 acres, the building has a gross area of 6,545,900 square feet. Its five floors, mezzanine and basement contain 3,704,013 square feet of office space, with 17½ miles of corridors. The building is occupied by branches of the Department of Defense.

WASHINGTON NATIONAL AIRPORT, 3½ miles south of the city, on the west bank of the Potomac, is one of the busiest air terminals in the country, handling both domestic and international flights. It is the only federally owned civilian airport in the United States and is operated by the Civil Aeronautics Administration. A close-up view of air operations is available from the observation gallery; admission ten cents.

we meet . . .

in washington, d. c. . . .

in 1960 . . .

editorial

Medical Direction for Physical Therapy Schools

At a recent meeting*, the Conference of Medical Directors of Schools of Physical Therapy approved the following statement defining the qualifications and responsibilities of a medical director of a curriculum in physical therapy:

"Physical therapy is an integral and inseparable part of the practice of medicine and, therefore, both the education of and practice by a physical therapist should be under medical supervision. It seems apparent that the supervision of an educational program should be provided by a physician with knowledge of physical therapy who is actively engaged in prescribing and supervising physical treatment.

"To qualify as a medical director of a curriculum in physical therapy the physician should: (a) be fully licensed to practice medicine in the State in which the school is located; (b) have had graduate training or equivalent education and experience that encompass medical aspects of the physical therapy curriculum; (c) have a teaching appointment in the educational institution responsible for the program; (d) maintain a direct and continuing contract with the educational program; (e) engage in clinical practice involving frequent use of physical therapy; and (f) actively participate in the periodic evaluation of the philosophy and the objectives of the school as relating to the training of physical therapists.

"The medical director of a curriculum in physical therapy should be administratively responsible for the organization, continued development, and overall effectiveness of the curriculum. The actual direction of the curriculum is delegated in large part to the educational administrator who is responsible directly to him and who functions with his advice and approval. Together they should develop administrative policy regarding operating funds, personnel, space requirements, equipment, recruitment, etc., in accordance with established policies of the institution concerned. Specifically the medical director should: (1) maintain direct contact with the educational administration of the institution in order to administer the curriculum with the advice and approval of those responsible for the educational programs of the institution; (2) be directly involved in the planning of the curriculum design and content; (3) actively participate in the teaching program; and (4) be a member of any committee dealing with students, their selection, admission, disciplining, and graduation."

By action of the Conference of Medical Directors, this statement was submitted to the Council on Medical Education and Hospitals of the American Medical Association with the recommendation that this definition be adopted by the Council and incorporated in the *Essentials of an Acceptable School of Physical Therapy*, which is published by the American Medical Association.

That physical therapy is part of the practice of medicine is generally agreed. Based upon this premise, the medical specialty of physical medicine and rehabilitation has received wide acceptance by medical educators, practicing physicians, and the lay public. For many years, the Council on Medical Education and Hospitals has inspected and approved schools of physical therapy and has established standards to guide in setting up such educational programs. If it were not convinced that physical therapy was an integral part of medicine, there would be no reason why the American Medical Association through its Council should be concerned with such programs. In its Code of Ethics, the American Physical Therapy Association declares (Article I, Section 1): "Physical therapy is a medical service and therefore is regarded as an integral part of this field."

There is general agreement that practice by a physical therapist must be under medical direction. The *Essentials of an Acceptable School of Physical Therapy*** state: "Therapists should be trained in these schools to work under the direction of qualified physicians and not to practice independently." "Clinical training and experience should be only in physical therapy departments which are under the direction of physicians whose qualifications are acceptable to the Council on Medical Education and Hospitals." The Code of Ethics of the American Physical Therapy Association states in Article I, Section 1: "The physical therapist shall carry on the techniques of the profession only with adequate and specific medical direction."

Despite agreement that physical therapy is part of the practice of medicine and that the physical therapist must work under medical direction, there has been no previous statement formulated to specify in detail the amount and extent of medical direction required in an educational program for physical therapists. Section I, subsection 3, of the *Essentials of an Acceptable School of Physical Therapy* contains only a brief paragraph regarding the medical director, namely:

> "A physician who is a physiatrist or other physician whose qualifications are acceptable to the Council on Medical Education and Hospitals, shall be responsible for the organization, periodic review, continued development and general effectiveness of the educational program. These functions shall be carried out with the educational administrator and in accord with the established policies of the institution or institutions concerned. Schools may wish to appoint a medical advisory committee to assist in formulating these policies."

This statement has been interpreted with considerable latitude by various schools of physical therapy. In many, the medical director has actively participated in all phases of the educational program, including personally given lectures to the student physical therapists. However, in some schools, due no doubt in part to limitations imposed upon him by other clinical, teaching and administrative responsibilities, the medical director has had little direct contact on a day to day basis with the training program. Such a situation is most unfortunate since physical therapists are not likely to realize fully their relationship to the practice of medicine and the need for medical direction unless they actually experience medical direction throughout their training program. A few schools have even substituted for the medical director a medical advisory committee of representatives of various medical specialties who meet periodically, probably no more than once or a few times a year, to give "medical direction" to the teaching program. Division of administrative responsibility among members of a medical advisory committee results in no medical direction for a program. Such an arrangement is incompatible with the stated objectives of physical therapy education formulated by the Council on Medical Education and Hospitals of the American Medical Association. Because of the confusion regarding the role of the medical director, the statement prepared by the Conference of Medical Directors of Schools of Physical Therapy is most timely and necessary.

The qualifications and responsibilities of the medical director, as set forth in this statement, are logical and fair. It should be noted that there is no requirement that the medical director be certified by a specialty board but that he be competent for such a position by reason of past experience, present status, and personal willingness to give effective medical direction to the curriculum in physical therapy. The Conference of Medical Directors of Schools of Physical Therapy is to be commended for its effort in formulating this statement.

—Paul A. Nelson, M.D.

•Held at the Palmer House, Chicago, February 6, 1960. The Conference of Medical Directors of Schools of Physical Therapy, which was organized in 1954, meets at the time of the annual meeting on Medical Education and Licensure of the American Medical Association to discuss matters pertaining to medical direction of curricula in physical therapy.

••Prepared by the Council on Medical Education and Hospitals of the American Medical Association [revised to Dec. 1, 1955, originally published JAMA 107:676 (Aug. 29) 1936].

survey of selected literature

This systematic abstracting and indexing of selected journals is made possible by a grant from the American Rehabilitation Foundation, a subsidiary of the Sister Elizabeth Kenny Foundation.

JOURNAL OF BONE AND JOINT SURGERY. *Vol. 42A, Jan. 1960.*

◇ **The Effects of Continued Compression on Living Articular Cartilage. R. B. Salter, and P. Field. pp. 31-49.**

It has been the observation of the authors that immobilization of a joint in a forced position results in a high incidence of joint degeneration occurring at a later time. To test the hypothesis that these joint changes were secondary to compression of the cartilage, joints of monkeys and rabbits were subjected to compression by clamps and by immobilization in a forced position. One hundred thirteen compressed joints were studied, 19 of which were unclassifiable because of complications resulting from vascular insufficiency, septic arthritis and other conditions. Of the remaining 94 joints, 87 showed classifiable lesions. The lesions were graded from gross and microscopic examination and varied from superficial necrosis to loss of the full thickness of articular cartilage. All joints subjected to continuous compression for six days or longer showed lesions and in one animal, cartilage changes occurred after just three days of compression. The lesions produced by simple immobilization of the joint in a forced position were similar to those produced by clamp compression. The articular lesion has been designated a pressure necrosis of cartilage which the author concludes is the result of interference with the diffusion of nutritive fluid from subchondral vessels through the intercellular substance of the cartilage. The necrosis is probably irreparable and may interfere with growth of the epiphysis. It also may act as a starting point in the development of degenerative arthritis.

◇ **Clinical and Electromyographic Evaluation of Patients with Anterior Transposition of Peroneal Tendons. W. H. Blodgett, and S. J. Houtz. pp. 59-76.**

Electromyographic studies were performed on the tibialis anterior, extensor digitorum longus, tibialis posterior, peroneus longus, peroneus brevis, gastrocnemius, and flexor digitorum longus of nine children subjected to anterior transposition of the peroneus longus tendon. These children had weakness in dorsiflexion and a dynamic valgus deformity secondary to poliomyelitis. Only children with residual paralysis limited to the leg under study were chosen. A common pre-operative electromyographic finding was an increase in the amplitude of the action potentials and a loss of rhythmic activity in the weak muscles. This was particularly true in the long extensors of the toes and tibialis anterior and least marked in the gastrocnemius muscle. After surgery the electrical activity normally present in the peroneus longus during the stance phase of walking usually shifts to the swing phase of walking. In one patient a progressive and complete transition of activity to the swing phase was demonstrated by a series of electromyograms recorded over a period of eight and one-half months.

In this series a good functional result occurred in patients whose electromyograms demonstrated partial or a complete shift of activity of the transposed muscle to the swing phase of walking. However, good results were also obtained in some patients not showing dorsiflexion activity in the swing phase. All patients with poor functional results had poor electromyographic evidence of transplant activity in the swing phase of walking. The inability of the central nervous system to adjust to modified and altered proprioceptive stimuli may be a factor in the successful functional results of this operative procedure; however, elimination of the dynamic valgus action of the peroneal muscle group and tendodesis effect of the transplant also play an important role.

Adductor myotomy and obturator neurectomy for the correction of adduction contracture of the hip in cerebral palsy. *Bank, H. H., and W. T. Green. p. 111.*

Pathological fractures of the spine. Etiology and diagnosis. A review of 105 cases. *Nicholas, J. A.; P. D. Wilson, and R. Freiberger. p. 127.*

In vivo osteocyte death. *Frost, H. M. p. 138.*

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AMERICAN JOURNAL OF PHYSICAL MEDICINE. *Vol. 38, Dec. 1959.*

◇ **Clinical Considerations on Innervation of Skeletal Muscle. G. Wohlfart. pp. 223-230.**

In diseases where there is slow destruction of the lower motor neuron such as amyotrophic lateral sclerosis, poliomyelitis, and herniations of the nucleus pulposa, there can be collateral regeneration, an ingrowth of nerve fibers from an intact motor unit to an area of denervation. The reinnervation of the denervated fibers occurs within two weeks and maturation of the sprouts takes several months.

Electromyographic examination indicates a relationship between the mean size of the motor unit and the mean duration of the action potential in the same muscle. In muscles with a greater number of fibers per motor unit the action potentials are of longer duration. In a pathological state such as in the myopathies, the short duration of the action potentials probably is because there are less fibers per motor unit. Conversely the prolonged duration of the action potentials in the lower motor neuron diseases may be secondary to collateral sprouting with enlargement of individual motor units. Another interesting electromyographic finding is the numerous polyphasic potentials appearing in recently innervated muscle. This is explained by the fact that outgrowing fibers are thin and the neuromuscular junctions immature. Conduction velocity is therefore retarded and varies from branch to branch — hence the polyphasia. Collateral regeneration may also be the cause of polyphasic potentials.

◇ **The Muscular Hypotonia of Infancy. S. Thieffry. pp. 231-238.**

Infantile spinal muscular atrophy of Werdnig-Hoffmann is the most common cause of muscular hypotonia in infants. Three forms of the disease are recognized in this study. (1) A congenital or a precocious form of spinal amyotrophy in which the disease has commenced during the last month of pregnancy or during the first month of life. (2) An infantile form of spinal muscular atrophy with an onset after birth and with a paralysis that therefore can be witnessed by observers. (3) Formes frustes which is a rare atrophy confined to the lower extremities.

The author feels that prognosis is grave in most instances and that the prognosis is dependent upon the involvement of the respiratory muscles. Since the diaphragm is never paralyzed in Werdnig-Hoffmann's disease, respiratory problems develop because of an inability to cough and clear secretions from the lungs.

Another reason for mortality is the development of contractures leading to deformities causing the patient to become bedridden. Of 40 patients the author followed, 9 are still living, their ages ranging between 2 and 11 years.

The author stresses the importance of the muscle biopsy for diagnosis. In Werdnig-Hoffmann's disease the muscle fibers are of unequal size, the majority being slender, and atrophied, whereas in muscular dystrophy there is an assortment of normal, atrophic and hypertrophic muscle fibers. These children are also of normal intellect which differentiates them from the hypotonias associated with intellectual retardation, i.e., mongolism, tay-sachs-amaurotic idiocy, and others.

Microwave exposure of the human female pelvis during early pregnancy and prior to conception. *Rubin, A., and W. J. Erdman II. p. 219.*

Functional organization of the afferent innervation of muscle studied in man by monosynaptic testing. *Paillard, J. p. 239.*

The physio-pathology of neuromuscular transmission and the tropic influence of motor innervation. *Desmendt, J. E. p. 248.*

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ACTA ORTHOPAEDICA SCANDINAVICA. *Vol. 29 (Part I), 1959.*

◇ **Snapping Scapula and Sprengel's Deformity. Ivar Alvik. pp. 10-15.**

Sprengel's deformity is a congenital deformity in which the affected scapula is smaller than usual and elevated with the upper edge far above the first rib. Both congenital and secondary changes are found in the muscles; often congenital changes are found in the cervical column and ribs. The author divides the deformity into two types. In type I, the upper medial corner of the scapula is connected to the cervical column by the os omovertebrale. The joint connection is a kind of syndesmosis. In type II, the upper medial part and corner of the scapula are bent forward in hook fashion and rest across the first rib. Moreover, the scapula is fixed to the surroundings by fibrous strips. In cases where the upper medial corner of the scapula is bulbously thickened, the author calls it snapping scapula of type I. During movement of the scapula the thickening slips over the ribs. This produces an easily audible snapping. It can also cause irritation and reactive changes such as bursa formation. In type II, the medial corner of the scapula is bent in the shape of a hook. In movement of the scapula, the point slips over the ribs and produces the snapping sound. Sometimes irritation occurs. Surgery is employed for correction of the deformity.

Influence of some plant enzymes on epiphyseal cartilage. *Hulth, A., and O. Westerborn. p. 1.*

Fatigue fractures of the lower extremities. *Rengman, E. p. 43.*

The etiology of congenital clubfoot. *Orofino, C. p. 59.*

Iliac gland biopsy in suspected tuberculosis of the hip. *Ladehoff, A. p. 71.*

ACTA ORTHOPAEDICA SCANDINAVICA. *Vol. 29 (Part II), 1959.*

◇ **Clinical Observation and Evaluation of Conservative Treatment of Acute Low Back Pain Due to Disc Lesion. H. Haimovici. pp. 98-107.**

Because of the frequency of unsatisfactory results of surgery in disc lesions, the author evaluates conservative treatment in acute low back pain with sciatica. Ninety patients (67 male and 23 female) presenting the acute clinical pattern of disc lesion were studied. Most of the patients were between 41-50 years of age. Physical strain at the onset of the syndrome was noted in 85 of the patients. Persons performing light tasks were more susceptible to considerable strain and to acute disc condition. Low back pain with sciatica was reported in 54 cases. Low back pain alone was reported in 34 cases, and sciatica alone was reported in two cases. Neurological findings were evident in 40 patients. X-rays revealed narrowing of the intervertebral space in 60 of the 90 patients. Of this group, 21 patients had their first attack while 69 patients had recurrent attacks of acute low back pain. The treatment was evaluated by estimating its effect on pain, function and the individual's ability to return to work.

Treatment with ACTH and cortisone was found to be disappointing. The use of Vitamin B-12 and X-ray treatments were also of no value. Epidural block was tried in several instances, and sometimes produced immediate relief of pain over a long period of time. This may be due to a rise of pain threshold, usually lowered for the compressed root, or by blocking of the many reflex pain pathways from the trigger area. In difficult cases a plaster jacket was applied to the patient; a spinal brace was later used. Manipulation was found to be of great value in a small number of carefully selected cases. Pelvic traction also proved to be worthwhile.

Iontophoresis with aconitine was tried. It gave remarkable relief in one-half of the treated patients. Of the patients under treatment, 91 per cent experienced complete relief and were returned to full function; 6 per cent were considerably improved and 2 per cent showed no improvement at all. This percentage was found to need surgery. Of the 90 patients reviewed, 84 returned to their previous work and 6 had to find new fields of endeavor.

Operated case of recurrent dislocation of the atlas. *Eriksson, B. p. 85.*

Arthritis in the manubristernal joint after trauma. *Lindholm, G. p. 90.*

Osteitis condensans ossis ilii. *Rojko, A., and Farkas, K. p. 108.*

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JOURNAL OF BONE AND JOINT SURGERY. *Vol. 41B, Nov. 1959.*

◇ **Congenital Dysplasia of the Hip. R. Leffmann. pp. 689-701.**

The author reviews the treatment of 80 infants with congenital dysplasia of the hip. There were 28 boys and 52 girls in the study and in one-third of the cases both hips were affected. The diagnosis was made before six months of age in 75 of the 80 cases.

Two physical signs were relied upon for diagnosis: (1) actual jumping of the femoral heads from the sockets when the hips were brought into the frog position and (2) limitation of abduction. Little value was placed on such classical signs as asymmetry of body contour, obliquity of the vulva, spontaneous outward rotation of the legs and unequal skin folds of the thighs. Radiographic findings could be equivocal especially in the younger infant where ossification of the femoral heads had not occurred. Such examination findings as a slanting or defective acetabular roof, absence or equal size of the ossification centers of the femoral heads or irregularly shaped ossification centers were findings that suggested dysplasia of the hips.

The author departed from conventional treatment of these children in that no treatment was used. Instead the patients were examined and x-rayed at monthly or two-monthly intervals. If there was any question that the condition was worsening, as was the case in five children, the patient was immobilized in Dennis-Brown splints at night. A deadline of eight months of age was set to determine whether further treatment would be necessary or whether weight bearing could begin. Of the 80 children, only nine children showed a full dislocation at eight months. The other children began weight bearing with apparently no symptomatic residuals of their disease.

The author feels that by far the greatest majority of patients with congenital dysplasia of the hip become normal spontaneously and that only a few of them will deteriorate into a true state of dislocation. He therefore feels that subjecting the child to many months in a cast or in pillow splints is unnecessary if the patient is followed carefully.

◇ **Infantile Structural Scoliosis. J. I. P. James; G. C. Lloyd-Roberts, and M. F. Pilcher. pp. 719-735.**

The authors report 212 infants who developed idiopathic scoliosis before the age of three years, the diagnosis being established by exclusion of congenital anomalies through early radiographs taken before distortion and deformities occur.

There are two types of infantile structural scoliosis, progressive and resolving. The former develops rapidly and relentlessly causing severe deformity, marked dwarfing and shortening of life. The resolving type resembles the progressive in the early stages but disappears spontaneously in the first few years of life.

In the children with progressive scoliosis the authors found 111 with thoracic curves. Males were most common and 80 per cent of the curves were left-sided. The most common site of the primary curvature was between the 5th and 12th thoracic vertebra. When first seen the curve is likely to exceed 20 degrees and it rapidly becomes worse during the first few years of life. Prognosis was difficult to establish because most of the patients were treated with Milwaukee jackets or spinal fusions before the curve deteriorated. However, two children reached skeletal maturity without operations and had curves of over 150 degrees. In 13 children two primary curves were found. Both curves can be present initially or the thoracic curve may develop slowly during the first three years of life with the lumbar curve appearing later. With two primary curves the prognosis is better.

In this series there were 77 cases of infantile structural resolving scoliosis; however, the authors feel the frequency is considerably greater since 77 per cent of the patients seen at one hospital had this type of curvature. The main characteristics of this curve is a spontaneous disappearance without treatment usually in the first few years of life. It is more prevalent in boys than girls in the ratio of 50 to 27. There were 65 left-sided curves and 12 right-sided curves with 72 of the curves being thoracic. One of the curves was noted at birth but 73 occurred in the first year of life. The highest incidence occurred between the fourth and tenth months. Most of these curves had disappeared by five years of age. More than half the patients had a maximum curve between 11 and 20 degrees. Compensatory curves were never seen. As they resolved the lateral curvature disappeared first leaving the only rotation which eventually disappeared.

Monarticular, non-infective, subacute arthritis of the sternoclavicular joint. *Bemner, R. A. p. 749.*

Avascular necrosis complicating undisplaced fractures of the neck of femur in children. *Durbin, F. C. p. 758.*

Fracture dislocation of the thoracolumbar spine. *Zadik, F. R. p. 772.*

The normal vascular supply of the vertebral column in the growing rabbit. *Amato, V. P., and R. Bombelli. p. 782.*

The vascular anatomy of the spine and its relationship to pyogenic vertebral osteomyelitis. *Wiley, A. M., and J. Trueta. p. 796.*

Club foot. *Wiley, A. M. p. 821.*

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ANNALS OF PHYSICAL MEDICINE. *Vol. 5, Nov. 1959.*

◇ **6-a-methyl Prednisolone in the Treatment of Rheumatoid Arthritis. M. Thompson. pp. 122-127.**

Fourteen patients with rheumatoid arthritis stabilized on prednisolone therapy were transferred to triamcinolone and subsequently to 6-a-methyl prednisolone. The period of treatment with triamcinolone and 6-a-methyl prednisolone was at least two weeks. The dosage of these two steroids was kept at 80 per cent of the prednisolone dosage. Measurements of hand grip, blood pressure, weight and erythrocyte sedimentation rate, as well as evaluations of disease activity and functional capacity, were made. For these short term trials no striking difference was observed between prednisolone, 6-a-methyl prednisolone, and triamcinolone as far as anti-rheumatic activity was concerned. A fall in blood pressure and weight loss was noted in 50 per cent of the patients during triamcinolone therapy. Dyspeptic symptoms developed during 6-a-methyl prednisolone therapy in three patients who previously tolerated prednisolone without dyspepsia.

◇ **Rehabilitation of Malleolar Fractures of the Tibia and Fibula. P. J. R. Nichols, and J. G. Parrish. pp. 128-140.**

During a ten-year period 191 patients with uni-bi-or tri-malleolar fractures of the ankle were seen at two rehabilitation centers. The rehabilitation program was directed at developing correct ambulation either in plaster or in the immediate post-plaster stage followed by the development of sufficient calf muscle power and ankle motion to allow the patients to run and jump without difficulty. Only two per cent of the patients were unable to return to full or modified duty. Where over two weeks elapsed from the time of removal of plaster and the time of transfer to a rehabilitation center, a delay of four to six weeks in full recovery resulted. This delay was due partly to a delay in the dispersion of post-plaster edema and to a delay in the development of calf muscle power. When rehabilitation measures were introduced before two weeks elapsed after removal of plaster, complete functional recovery was attained within six weeks. Thirty-three per cent of the patients developed post-plaster edema which was controlled best with an elastic webbing bandage. Organized exercises in plaster did not result in a quicker return in ability to walk, jump or run.

The value of mucoprotein levels and other serological reactions in rheumatoid arthritis. *Feldman, C.; E. V. Hess, and R. L. Markham. p. 113.*

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NEUROLOGY. *Vol. 10, Jan. 1960.*

◇ **Dystrophia Myotonica. N. Pachomov, and J. E. Caughey. pp. 28-37.**

Electromyograms of the long flexor muscles of the fingers were studied at rest, during a five second contraction, and immediately after relaxation in six patients with dystrophia myotonica. In five patients spontaneous electrical activity consisting either of a continuous discharge or bursts of single high voltage spikes of variable frequency was present. Interpretation of the exact end point of the myotonia after grip relaxation was therefore difficult. The effect of six drugs on the duration of the myotonia and of the electrical activity at rest was studied. Procaine amide, quinine sulfate, and glucocorticoids showed the greatest effect in decreasing spontaneous activity and in reducing the duration of the myotonia. The action of these drugs at the muscle fiber membrane reduces permeability to increase the potassium uptake of the muscle fiber.

◇ **X-ray Radiation of Experimental Lesions of the Spinal Cord. C. E. Turbes; L. W. Freeman, and D. C. Gastineau. pp. 84-89.**

Spinal cord transections at the level of the 8th and 9th thoracic vertebrae were performed on 61 adult dogs. Thirty-eight animals received postoperative radiation either immediately after surgery or on the first, second or third postoperative day. Six animals received two courses of radiation therapy, one immediately after surgery and another one week later. One thousand rads was delivered to the operative site at each treatment.

The control and radiated animals survived from about one to four months except for the six radiated animals subjected to a total of 2000 rads; four were sacrificed at one year, one at one and one-half years and one at three and one-half years. At death or at the time of sacrifice, the spinal cord specimens were examined histologically. In the animals receiving radiation therapy, connective tissue was lessened throughout the entire path of the surgical approach. Spinal cord scarring was reduced in the radiated animals who received their treatment either on the second or third postoperative day. The decrease in density and vascularity of the scar in the treated animals was more marked the longer the animal was carried after surgery. The animals receiving two courses of radiation showed an even greater decrease in collagenous connective tissue.

A clinical and pathologic study of akinetic mutism. *Cravioto, H.; J. Silverman, and I. Feigin. p. 10.*

Dissecting aneurysms of intracranial arteries. *Scott, G. E.; K. T. Neubuerger, and J. Denst. p. 22.*

Reserpine in Huntington's chorea. *Kempinsky, W. H.; W. R. Boniface; P. P. Morgan, and A. K. Busch. p. 38.*

Ischemic neuropathy in necrotizing arteritis. *Holt, G. W. p. 43.*

Symptoms and diagnosis of diastematomyelia. *Perret, G. p. 51.*

Procaine-oil-wax pallidotomy for double athetosis and spastic states in infantile cerebral palsy. *Narabayashi, H.; H. Shimazu; Y. Fujita; S. Shikiba; P. Nagao, and N. Nagahata. p. 61.*

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2. Manuscripts must be in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, Ill., not later than May 2, 1960. This deadline will be rigidly maintained.

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5. The winning contribution will be determined by the Program Committee of the 3rd International Congress of Physical Medicine.

6. All contributions will become the property of the American Congress of Physical Medicine and Rehabilitation and will be released to the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION for publication as determined by its Editorial Board.

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